

ARCHIVES OF OTOTOLOGY.

MIDDLE-EAR DISEASE IN ITS RELATION TO METASTATIC ABSCESS OF THE LIVER AND OTHER VISCERA.¹

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THE subject which I have the honor of discussing with you this evening is one, I trust, in which the aurist is not alone in finding interest, and yet it should demand his consideration none the less because of its general medical and surgical associations. As we advance more and more in modern scientific study, freeing ourselves from inherited beliefs or traditional conclusions, we are enabled to break away from that narrow idea of "Specialism," having only to do with that *particular organ* which one may be supposed to "treat." Each part of the body, however small or obscure, undoubtedly exerts, according to its condition of health or disease, some influence toward the perfect or imperfect working of the systemic mechanism.

From the time of Hippocrates there seems to have been a conspiracy of scientists, philosophers, moralists, and humorists against that much-abused organ, *the liver*, stigmatizing it as in some way responsible for all the ills to which flesh is heir; and while the writer may not feel disposed to wholly exonerate that organ, he will, however, attempt to expose a new accomplice in the matter of multiple-abscess dissemination. Indeed, the evidence which he has to present may convict the innocent-appearing organ, the ear, of being in many cases the instigator of the evil done, the infective

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source from which the virile germs set out upon their deadly mission.

It is generally conceded that a suppurative inflammation of the liver can occur only when infective bacteria gain access to that organ; indeed, recent investigation seems conclusive in eliminating the probability of a primary hepatic abscess. But, if the contention that all cases of abscess of the liver have their origin in some other part of the body has been or can be sustained by actual clinical and post-mortem investigation, an interesting question at once arises—what feasible explanation can be given as to the etiologic factors in the so-called "spontaneous abscess of the liver"? All agree that the majority of cases of abscess of the liver are due to infection from either dysentery, appendicitis, suppurating hemorrhoids, gastric ulcer, osteomyelitis, or by metastasis from a similar process involving the lungs, kidney, or spleen. To the mind of the writer it seems quite as conclusive that many of the so-called spontaneous cases are due to a metastatic infection having its origin in the organ of hearing. Thus, while the writer has not been able in his research to find any other such cases recorded, the history of those herein presented will illustrate this point.

CASE I.—J. W. D., male, aged forty-two, has had a suppurative otitis media extending over a period of twenty-seven years, the original infection complicating an attack of pneumonia. For about twenty years following the spontaneous rupture of the right membrana tympani, the patient suffered no inconvenience except a continued slight discharge from the ear. Then the disease became quiescent and the patient felt that he had been cured, the ultimate outcome of his former condition never having given him any concern except from a cosmetic standpoint. But this immunity was enjoyed for about two years only, when he suffered a relapse, which was characterized by severe pain for two or three days, followed by an offensive reddish-yellow discharge from the meatus, with a simultaneous subsidence of the acute pain. There was marked improvement, however, within a few weeks in regard to both the quantity and quality of the discharge, though at the end of about one year he again suffered from an acute exacerbation, which recurred at frequent intervals during the following three years.

It was while suffering from one of these acute exacerbations, and about three weeks before the patient's death, that the writer saw the case with the attending physician. Briefly, the clinical picture was as follows: After a severe chill the patient's temperature suddenly registered 105.2° F., which was followed by a profuse sweat. The only pain complained of was located in the right shoulder and neck, and was intensified when the patient moved or rested on his left side. A moderate muddy yellowness of the skin was noticeable on close inspection, the conjunctivæ, however, being normal. The aural examination revealed a chronic suppurative otitis media, with entire destruction of the membrana tympani, malleus, and incus; there was no acute inflammatory condition involving the tympanic cavity or canal, nor did the superior and posterior wall show any evidence of undue redness or drooping. The middle ear was entirely free from any granulation tissue or other pathologic process. Pus was, of course, present, but was small in quantity and quite offensive. On microscopical examination it showed the presence of streptococcus pyogenes, staphylococcus pyogenes albus and aureus, and the pneumococcus. The patient complained of no discomfort whatever about the head, and the mastoid and adjacent parts showed no evidence of involvement. The irregular fever, with chills and sweats, together with an ever-increasing pain in the right shoulder and neck, continued until within one week of his death, when for the first time he also complained of some pain in the right hypochondrium. On examination the attending physician observed distinct enlargement of the liver, with tenderness on pressure, and at the same time a marked increase of the icterus was noted.

The temperature was pyæmic throughout this latter attack, varying from almost normal to 106.6° F. The chills during the last week of his illness were not severe, but his sweats were most profuse, at times saturating the bed-clothing. After the true nature of his illness became manifest, the patient received the most energetic treatment and intelligent care at the hands of his attending physician. Aspiration or other operative interference was not resorted to, the wisdom of which course was afterward sustained by the post-mortem examination. Immediately preceding the patient's death the temperature registered 106° and a fraction, death occurring while in a state of violent convulsions. It is well to state that in connection with various methods of

treatment anti-streptococcic serum was used in full doses with only passing benefit.

The results of the post-mortem were interesting from the fact that every viscus except the liver was found to be normal, *the liver being a mass of miliary abscesses.* The coalescence of some of these minute abscesses formed one cavity about the size of an egg, in the right lobe. An especially interesting part of the patient's history was the incessant, and at times very severe, pain involving the right shoulder and neck. On two separate occasions, the writer felt he was not only justified but that it was his duty to make an exploratory incision to determine the possibility of a thrombosed jugular, notwithstanding all symptoms of such a condition, minus pain and suggestive temperature, were absent. The results of the autopsy demonstrated that the better judgment prevailed. It was also especially interesting to note the normal condition of the mastoid and interior of the skull generally.

CASE 2.—The second case seen by the writer was that of a male, twenty-six years of age. Eight years ago he developed a suppurative otitis media complicating a severe attack of influenza; the discharge continued without interruption, and there was an entire absence of suffering of any kind incident to his ear. Aside from this attack of influenza and the ear complication, he had always enjoyed good health. For about five weeks prior to the time the writer saw this patient, he had been treated for "a low grade of fever," the special characteristics of which were general malaise, disordered digestion, muscular weakness, disturbed sleep, and a slight rise of temperature in the evening. Quite unexpectedly he was taken with a severe pain in the right shoulder, which in a few hours extended into the neck; it was also thought that an increased amount of discharge escaped from his ear, and for this and the pain in the neck the writer was called in consultation. On entering the bedroom the attending physician announced that a slight general jaundice had appeared within the past hour or two. He had also developed a cough, and his temperature rose rather suddenly to 104.2° F. at noon, subsequent to a chill. The ear condition was similar to that of the case first cited, except the character of the discharge

was not so offensive. So also were the other symptoms similar to the first case, with the addition of the chest complication. The patient's temperature was septic, with very marked accessions and remissions, with accompanying chills, death occurring in less than a week.

The autopsy revealed multiple pus foci in the liver, as in the former case, together with a similar condition of the lungs. None of the other organs nor the interior of the skull showed any evidence of disease.

Of the four other cases which the writer has seen, similar to the foregoing, only one, and that the most recent, will be reported at this time. Thanks are due to Dr. W. E. Lee and Dr. H. C. Groff, House Surgeons of the Germantown Hospital, for the notes in the following case:

CASE 3.—J. H. P., age twenty years, admitted to Germantown Hospital, April 24, 1903. Occupation, gardener. Habits always good. No alcohol or tobacco used. Family history: Father died when patient was a boy, cause unknown; mother living, mentally deranged; one sister living and well. Patient had measles at four years; no scarlet fever; no diphtheria. Practically always in good health. Following the attack of measles, he developed a discharge from the right ear. The discharge was of the recurrent type, each acute exacerbation being preceded by the usual discomfort, pain, and fever until the suppuration would again start. For six months previous to present attack there was no discharge.

History of present illness: On April 20, 1903, a purulent discharge again appeared, and a physician was consulted who prescribed the use of a solution of carbolic acid to be used in syringing the ear, there being nothing more than a fetid discharge; no pain, no fever, no edema, no tenderness. April 22d, the same physician, Dr. Geisler, again saw the patient, who at this time complained of severe, constant pain within the head and posterior to the right ear. Temperature at this time 98° F. Pulse 96.

April 23d.—Temperature 99.8°; pulse 96; condition the same.

April 24th.—Temperature 103.6°; pulse 100; constant pain; delirium at times; complains of feeling cold. On this date patient was brought to hospital in ambulance, complaining of con-

stant pain in head, especially about the region of right ear. Pupils equal and reacted to light; patient is fairly well nourished, but very anæmic; discharge from right ear; tenderness on percussion over right mastoid; no swelling; no œdema; no redness; heart and lungs normal; temperature 102° ; pulse 100; respiration 34.

Operation, afternoon of April 24th, by Dr. S. MacCuen Smith.—The mastoid was found markedly necrosed, containing considerable pus and granulation tissue; no evidence of sinus involvement. All necrotic material visible was removed, and cavity drained.

April 25th.—Patient fairly comfortable; complained of but slight discomfort at the seat of operation. Dressing not disturbed.

April 26th.—Temperature 102° ; pulse 88; respiration 24. The dressing was removed and found to be very offensive. Temperature during day rose to 104.4° ; anti-streptococcic serum given, 30,000 units. Complained of pain in side of head and was very restless.

April 27th.—Discharge on dressing, considerable; odor very offensive. Temperature 103° ; pulse 134; respiration 28.

Second Operation, by Dr. S. MacCuen Smith.—The cavity made by first operation thoroughly cleansed; apparently healthy bone removed from front of sigmoid sinus, and sinus found to be thrombosed. The sinus was curetted both ways, until there was free bleeding, and then packed. The cavity was explored in all directions, but nothing further found. Following this operation, temperature dropped to 97° by axilla; pulse 68; respiration 24.

April 28th.—Patient is more comfortable; temperature normal.

April 29th.—No change; dressings renewed.

April 30th.—Dressing removed from lateral sinus; no bleeding; condition same as on previous day.

May 1st.—Temperature 99° ; pulse 72; discharge from ear continues, but quantity is less. Wound washed with formalin, 1:1500, and pure alcohol.

May 4th.—Wound dressed; considerable discharge; dirty yellow pus; chill, with temperature of 105° ; pulse 134; respiration 34.

May 5th.—Septic temperature; complains of pain in shoulders, back, and hip; mastoid dressed.

May 6th.—Condition same as previous day.

May 7th.—Chill to-day, with temperature 106° ; pulse 134;

respiration 34. Ear redressed; large quantity of offensive discharge present. Severe pain on site of wound. Pupils normal; Bovinsky's sign absent. Tongue protruded normally; mentality not affected. Neck drawn backward and muscles rigid. Complains of severe pain in right shoulder and neck; cannot move head without moving entire body. Secreted seventy-eight ounces of urine in last twenty-four hours.

May 8th.—Same condition; another chill.

May 9th.—Pain in shoulder and neck continues; slight tenderness over jugular vein. Temperature 105° , followed by a chill.

May 10th.—Pain in shoulder and neck continues severe; tenderness over jugular more marked; no swelling or oedema.

May 11th.—A consultation with the surgical staff, Drs. Müller, Deaver, Stewart, Ross, and LeConte, was held. Neck very painful, with marked swelling and oedema. Had two chills, temperature reaching 105° ; pulse 128; respiration 36.

May 12th.—Temperature in morning subnormal; afternoon 104° ; pulse 128; respiration 36.

Third operation, by Drs. MacCuen Smith and Stewart. Lateral sinus opened; blood rather thick, but no thrombus was found. An exploratory incision was made over the jugular, but it was found to be healthy.

May 13th.—More comfortable; pain and tenderness in right shoulder and neck persists. Temperature had reached normal, but rose again.

May 14th.—Two chills, temperature reaching 106.8° ; pulse 148; respiration 48. Great pain in muscles of extremities, neck, and loins. Markedly cyanosed with each chill. Pupils equal; tongue dry and brown; respirations short and labored; râles throughout chest; liver very tender; no jaundice; urine pale and negative.

May 15th.—Mind dull, dozing most of the time; does not complain of pain; little nourishment taken; tongue brown and dry. Dressings changed, no discharge, no odor; packing left in sinus; one chill during day.

May 16th.—Another chill, temperature not as high as on previous days. Nails blue; respirations quick and labored, 46 to 60; râles throughout chest; is delirious; when aroused speaks rationally. Pulse weak and rapid, 160.

May 17th.—Unconscious; skin yellow; conjunctiva yellow; respirations rapid; pulse weak and rapid; temperature falling. Death at 8:30 A.M.

Post-Mortem Examination.—Body emaciated; rigor mortis present; skin over the entire body of a saffron color; pupils equal; sclera and conjunctiva yellow. There is an opening in the right mastoid bone, $1\frac{1}{4}$ inches in diameter. The middle-ear and mastoid process of the temporal bone have been opened and curetted. Removing the skull-cap, find the dura is normal, except that portion lining the petrous portion of the temporal bone, which is a dark purple color and thickened. That part covering the opening of the mastoid contains a small opening the size of a pea, beneath which the cortex of the brain exhibits a mottled red appearance. The brain here is black and soft for a distance of half an inch. Otherwise the brain is normal. The sigmoid and lateral sinuses have been removed.

Lungs.—Pleura smooth and glistening; a deep red color; lung tissue sinks when placed in water. *Beneath the pleura* are numerous small cream-colored areas about the size of a mustard seed. On section the *lung* is firm, dark purple in color, and scattered through it are similar cream-colored areas; some as large as a walnut.

Liver.—Weighs 2000g; dark red in color; capsule smooth and glistening; beneath are numerous small cream-colored areas, similar to those found in the lungs. On section, the cut surface is pale, portal spaces distinct, cloudy swelling, and scattered throughout are many small abscesses, similar to those in lung.

Heart.—Normal.

Spleen.—Weighs 250g; capsule smooth and glistening; strips easily; beneath capsule and scattered through the medulla are many yellow areas, similar to those found in lungs and liver.

Kidneys.—Pale; capsule strips readily; no miliary abscesses.

In those cases where more than one viscus was implicated it can readily be understood how the liver could become involved secondarily. But when it is recalled that in two instances the liver alone was involved, and in two additional cases the lungs were also the site of multiple pus foci, we cannot so readily explain the exact *modus operandi* of hepatic metastatic abscess, especially when the lung involvement in these two cases was manifestly secondary to that of the liver. Traumatism was not suspected in any of these cases.

Eichhorst, *Practice of Medicine*, vol. i., page 328, says:

"Any of the vessels of the liver may be the portal of entry for bacteria into the organ. Bacteria can enter the liver through the hepatic veins only by passing in a direction contrary to that of the blood stream. Experimental investigation has shown that corpuscular elements may pass downward in the inferior vena cava, in opposition to the blood stream toward the heart, and enter the hepatic veins, and this phenomenon has been accepted in explanation of cases of suppuration of the liver in which hepatic abscesses have developed in the sequence of inflammation and suppuration of the cranium and at the periphery of the body. At the present day such an assumption is, in our opinion, no longer necessary, if they have gained entrance through the superior vena cava to the right auricle, the right ventricle, and the pulmonary artery, migrate through the pulmonary capillaries, and penetrate the pulmonary veins, the left side of the heart, the aorta, and the hepatic artery. Only if the question arose as to the dissemination of coarse solid particles, would scarcely any other explanation be conceivable, than through the vena cava and thence into the hepatic veins and their ramifications."

Arnold's experiments on dogs (*Ziegler's Pathology*, p. 43) have demonstrated that foreign bodies, small particles of wheat, introduced into the jugular veins, crural veins, longitudinal sinus, and dura mater, and which were too large to pass through the capillaries, were carried by a current running in reverse direction, not only into the trunks, but also into the smallest branches of the veins in the liver, kidneys, heart, extremities, dura and pia mater, also into the orbits, as well as into the post-bronchial veins.

Milligan, in discussing the complications of suppurative otitis media (mostly of the chronic form), asserts that "not only may thrombosis affect the various intracranial sinuses, but minute particles becoming detached may be carried with the blood stream to distant organs, there to set up metastatic abscesses. Such deposits may be found in the lungs, pleurae, spleen, kidneys, etc." He further quotes several interesting cases seen in consultation with physicians, in one of which "violent septic jaundice developed." Al-

though it is not stated, it is nevertheless highly probable that this patient died either from multiple abscess of the liver, traceable directly to the primary infection in the organ of hearing, or else the liver became secondarily involved from a similar process in a neighboring viscus. At all events, in these cases, as well as those coming under my own observation, it seems clear that the focus of primary infection was located in the temporal bone, regardless of which one of the viscera was first implicated.

In some of the writer's cases it is interesting to note the relatively mild form of the ear disease. In fact, in most of them the ear had received no consideration whatever until attention was directed to that organ by the continued and increasing pain of the right shoulder and neck. With possibly one exception, a largely increased quantity of pus escaped from the meatus; in only three cases, however, did the character of the discharge change to any appreciable extent.

To briefly summarize the most interesting features in this series of unusual cases:

1. The most notable early symptom was the acute exacerbation of a chronic aural discharge, which, although usually innocuous in character, in a few cases became ichorous, and should have pointed suspiciously to a possible systemic infection.
2. The most constant and characteristic symptom was that of *severe pain in the right shoulder and neck*, which appeared synchronously with the beginning of hepatic suppuration.
3. The manifestation of pain and tenderness in the right hypochondrium unerringly indicated the liver as the seat of disease.
4. The repeated chills, unusually high temperature, and leaky skin demonstrated that the toxic process was septic in character and likely to prove fatal.
5. The marked accessions and remissions of temperature were typical of an acute suppurative hepatitis or multiple abscess of the liver.
6. While jaundice was a constant factor, it appeared so

irregularly as to be of little diagnostic value, save in a confirmatory way.

7. The history of secondary infection in each of these cases is sufficiently clear to warrant the conclusion that a metastatic abscess of the liver, or other viscera, may originate from a suppurative disease of the ear.

A CONTRIBUTION TO THE PATHOLOGICAL ANATOMY OF THE INTERNAL EAR AND THE AUDITORY NERVE.

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Abridged Translation by Dr. ADOLPH O. PFINGST, Louisville, Ky.

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DISEASE of the labyrinth and the eighth nerve has been divided into the primary affections and those occurring secondary to other affections. The latter are by far the most common, and are nearly always the result of an extension of the inflammation from the middle ear. Disregarding for the present those cases resulting from acute inflammations of the middle-ear, I will include in this report seven cases of labyrinth disease complicating chronic middle-ear diseases. Steinbruegge (1), who was one of the first to describe affections of the internal ear, made no distinction between primary and secondary cases, and merely mentioned the frequency of the extension of the disease from the tympanum. Habermann (2), in a later publication, differentiated between the cases accompanying acute and those complicating chronic middle-ear inflammations. According to his observation, the internal ear was affected more frequently in the acute than in the chronic cases. In his experience, disease in the internal ear involved principally the first turn of the cochlea, causing fibrous adhesions, calcareous degeneration, bony developments, and nerve atrophy. Mygind (3 and 4) observed similar changes in the cochlea, and Moos (5) in the vestibule of deaf-and-dumb

children. All of their cases had, during life, been subjects of chronic purulent otitis media. The pathological changes in all of these early cases were described only from a microscopic standpoint. Panse (6) reported five similar cases, and was probably the first to include microscopic findings in his report. The subject offers a good field for further microscopic research.

CASE 1.—Age twenty-four; history of chronic O. M. P. on the right side, was subjected to operation on account of general symptoms of brain abscess, viz.: headache, slow pulse (64), moderately high temperature, and choked disc. The tympanic cavity and the antrum were found full of muco-pus, and were thoroughly cleansed. Subsequently the middle and posterior cranial fossæ of the skull were exposed, and repeated puncture made into the temporal lobe and the cerebellum without finding pus. Death followed in five days.

The autopsy revealed the following conditions: The drum was very much thickened, and was marked by a perforation extending across Schrapnell's membrane. The edges of the perforation were covered with squamous epithelium in several layers. The periosteum and submucous tissue of the tympanum were replaced by granulation tissue, which, however, was covered by the normal columnar epithelial lining of the cavity. The interior of the cavity was filled with pus. The bone under the granulation tissue was rough and portions of it replaced by granulation tissue. Typical Howship's lacunæ containing osteoclasts were observed in the depressions. In the attic, just inside of the perforation in the drum, a cholesteatomatous mass, about the size of a mustard seed, was found, surrounded by granulation tissue. It had a fibrous capsule, lined on both sides with stratified squamous epithelium, and contained in its interior desquamated horny epithelial cells and typical lamellæ of cholesteatoma. A strand of squamous epithelial tissue in several strata extended from the perforation in the drum to the wall of this body.

Examination of the ossicles showed that the greater portion of the foot-plate of the stapes had undergone necrosis as well as portions of the crura. The bone had been replaced by granulation tissue, which extended through the fenestra ovale into the vestibule. The bony edges of the fenestra were rough and irregular. The entire vestibule was filled with a mass which was

made up in its interior of granulation tissue, and close to the bony wall contained new connective tissue, well supplied with cellular elements. Proliferation of the adjacent bone was indicated by the presence of new osseous trabeculae lined with osteoblasts.

The osseous semicircular canals were not involved, but the lumen of the membranous portion was almost completely filled out with newly formed connective tissue. Only at intervals the lumen could be made out. It was lined with epithelium and filled with a gelatinous hyaline material.

The cochlea was also the seat of extensive changes. With the exception of a small portion of the last turn the entire membranous cochlea was filled with a white, rather dense mass. The microscope showed that the tissue in the first turn was a very cellular granulation tissue, in which an occasional strand of white fibrous tissue was visible, in proximity to the osseous wall. Not a vestige of Corti's organ, Reissner's membrane, the basilar membrane, or the lamina spirale ossea could be found. The changes in the second turn, although similar, were less extensive than those of the basilar turn. The lamina spirale ossea and a portion of the organ of Corti were still intact. In the last turn the changes were still less marked, tissue of the kind present in the rest of the canal being found only in the scala tympani, which was completely filled with it. In the scala vestibuli and scala media there was no granulation tissue, but these spaces, as well as the aqueductus cochleæ, were filled with a peculiar colorless, glassy, hyaline material, entirely devoid of cellular and fibrous elements. Reissner's and Corti's membranes were absent, as was also the epithelial lining of the scala and the ligamentum spirale. Corti's organ was intact and almost normal. The ganglion spirale was partially replaced by granulations and hyaline material.

The auditory nerve was very much enlarged and filled up almost the entire internal auditory canal. Microscopically, the cause of its enlargement was seen in a cellular infiltration between the nerve fibres. In addition there was some hyaline material which contained a few round cells. In some portions of the nerve trunk the nerve substance had been replaced by fibrous tissue. The facial nerve was surrounded and partly infiltrated by similar tissue. In following the auditory nerve inwards, it was observed that as it approached the labyrinth it became more and more normal, although its fibres were separated by the

interposition of round cells and hyaline material, resembling the tissue in the canal of the cochlea, as far as its termination.

Reviewing this case briefly, we find the following points of especial interest: in the tympanic cavity, the presence of normal epithelial lining, or rather the absence of squamous epithelium, with the exception of that lining the perforation in the drum, and the narrow epithelial pedicle stretching from the edge of the perforation to the cholesteatomatous mass. These conditions indicate plainly an inward growth of the epidermis, terminating in the development of a cholesteatoma. It exemplifies the theory of Habermann-Bezold of the development of cholesteatoma. It showed beautifully the continuity of the epidermis with the cholesteatoma through the narrow bridge of tissue, and also excluded the possibility of development of the cholesteatoma from the intratympanic epithelium, which was entirely columnar.

The extensive necrosis of bone in and about the tympanum, encroaching upon the internal ear at the pyramid, and the invasion of the vestibule by granulation tissue through the foramen ovale, were other noteworthy features of this case.

In the internal ear, the mass of granulation tissue in the vestibule and most of the cochlea, and the hyaline material in the cochlea, vestibule, and between the fibres of the auditory nerve, were features of more than usual interest. The exudate in the upper part of the cochlea and in part of the nerve was structureless and transparent, resembling the matrix of hyaline cartilage. It contained a sparse amount of cellular tissue and some new blood-vessels. The material found in the other portions of the internal ear was organized tissue and was looked upon as a hyaline connective-tissue.

CASE 2.—A specimen removed from a subject who had been afflicted with O. M. P. Chron. Cause of otitis, clinical history, and cause of death not ascertained.

Microscopically the drum membrane and the ossicles had apparently been entirely destroyed. The auditory nerve was very much thickened and, with the facial nerve, filled out the entire

internal auditory meatus. The fenestra ovale was blocked with a white, rather firm mass. The cochlear canal contained similar material. The mass extending through the oval window was made up histologically of typical granulation tissue and could be traced from the tympanum into the vestibule. A portion of it was made up of vascular connective-tissue between the fibres of which stellate and spheroidal cells were deposited. A sharp line of division could not be made between this and the granulation tissue. The membranous vestibule had been entirely destroyed and the cavity filled, partly with an organized mass and partly with inspissated pus and a granular material in which small fragments of bone were visible, evidently remnants of the stapes. The granulation tissue in parts encroached upon the bone, extending into its interior and thereby forming pits separated by projecting spiculae of bone. The pits contained, besides granulation tissue, typical Howship's lacunæ and osteoclasts. The changes in the semicircular canals were identical with those of the vestibule; there was an absence of the membranous portion, and their lumen was filled with granulation tissue and pus. Invasion of the bone had also taken place.

The process in the cochlea, although extensive, had not involved the bone. The membranous portion had been almost completely destroyed, no vestige of Corti's organ or of the epithelial lining remaining intact. The scalæ contained masses of inspissated pus and some granulation tissue, but no organized fibrous structure like that found in the vestibule. Rosenthal's canal was almost entirely filled with granulation tissue and pus, leaving only portions of the spiral ganglion intact.

The internal auditory canal was tightly filled with a cord made up of the auditory and facial nerves and the periosteal lining. The trunk of the auditory nerve was made up largely of a vascular connective-tissue, between the strands of which deposits of calcium salts were visible. More centrally it was in a more normal condition. Groups of round cells between the nerve fibres were the only indication of inflammation. Toward the labyrinth, erosion of the bone had taken place. Osteoclasts and Howship's lacunæ were abundant.

The interesting feature of this case was the relation of the pathological changes in the different parts to the time of exposure to the inflammatory process. In the tympanic

cavity, where we must assume the origin of the disturbance and where the process had consequently lasted longest, the changes were proportionately extensive. They were less marked in the vestibule, still less in the cochlea, and least in the auditory nerve where the evidences of inflammation diminished as the nerve approached its central end.

This case resembled the first case in the extension of the inflammatory process from the tympanum to the internal ear through the *fenestra ovalis*, after destruction of the foot-plate of the stapes. There was also similarity of the pathological process in the labyrinth. The cases differed only in the nature of the changes in the bone. In the first there was a tendency to the formation of new bone, while in the other degenerative and resorption processes predominated.

CASE 3.—Aged forty ; otorrhœa on right side since childhood ; deaf and dumb for six years ; acute symptoms with vomiting for three weeks. Removal of granulations and cholesteatoma from the tympanic cavity with no relief of symptoms ; mastoid operation ; death four days later.

Post-Mortem Findings: Marked thickening of the mucous membrane of the middle ear ; covering of stratified flattened cells, the most superficial horny and supporting large lamellæ of cholesteatoma. The stapes was absent, and in its place a mass of granulation tissue projecting through the *fenestra ovale* into the vestibule. The membranous cochlea was also absent, granulation tissue and a finely granular material filling up the canal. In some portions there were newly formed lamellæ of bone arranged in a wide mesh. The trabeculæ contained rudimentary lacunæ without bone corpuscles. The bony walls of the tympanic cavity showed evidences of resorption.

The auditory nerve was the seat of marked pathological changes. Instead of the usual division at the entrance into the labyrinth, it appeared as a fibrous cord, the intervening lamellæ of bone having been absorbed. The trunk of the nerve instead of being made up of nerve fibres was one mass of granulation tissue.

Isolated fragments of nerve fibres were scattered through this tissue. Portions of the nerve tissue had been transformed into fibrous cords. In some places the connective tissue was made up of very fine fibres and contained but few connective-

tissue corpuscles. This tissue was exceptionally vascular and the fibres were arranged in a coarse reticulum. In other portions the fibres formed a closer mesh and the interstices were packed with round cells. Many of these cells were polynuclear, some containing as high as 18 nuclei.

We had to deal in this case with chronic otitis media with secondary cholesteatomatous formation and involvement of the labyrinth. As in the previous cases the avenue of extension of the disease from the middle to the internal ear was the foramen ovale. The pathological changes in the internal ear were more extensive than in the preceding cases, the membranous portion being almost completely destroyed and the bone extensively eroded.

The most marked changes were found in the auditory nerve, and were evidently the result of a chronic interstitial neuritis. The inflammatory process was evidenced in the excessive development of fibrous connective-tissue and the infiltration of the trunk with round cells. In the portion of the nerve in which the cellular elements predominated, the small amount of fibrous structure entered into the formation of a reticulum, or framework, for the mass of cells. The latter were of a peculiar variety. But few of them were of the stellate variety usually present in connective tissue, the mass between the fibrous meshes consisting of rather large round cells, most of them polynuclear. The bodies of the largest cells were marked by lines dividing them into compartments. In most of the cells the protoplasm contained vacuoles and a few of them had become vesicular. In the small cells the nuclei were situated eccentrically, while in the larger ones the nuclei, which numbered as high as 18 to a cell, were crowded together in the centre of the protoplasm. The markings of the cells, already alluded to, extended in a radiating manner from this group of nuclei to the periphery. (See Fig. 4.)

Peculiar cells of this variety have been described by Langhans (7) and his followers in cachexia thyreopriva. They were described as large vesicular cells with little or no protoplasm, and marked by trabeculae extending from

the cell wall into the interior of the cell and dividing it into a variable number of compartments. The nuclei were situated just inside the cell wall, each cell containing from 1 to 3 nuclei. The cells were believed to originate in the endothelial cells inside the primitive sheaths of the nerve fibres. Kopp (8), Weiss (9), and other investigators observed similar vesicular nucleated cells in the nerves of lower animals, particularly in dogs, and looked upon them as endothelial growths arising in the endoneurium and perineurium. These authors found cells with from 1 to 3 nuclei. None of them described large multinuclear cells as they were found in my case.

CASE 4.—Age forty-five; right O. M. P. Chron.; abscess of neck; radical operation; abscess of right temporal lobe; meningitis; death.

Microscopic examination revealed a thin coating of pus and granulation tissue over the bone of the tympanic cavity. The plate of the stapes was dislocated slightly towards the vestibule, and was fissured transversely, but showed no evidences of a necrotic process. The bone at the posterior and upper border of the fenestra ovalis was also marked by a breach in its continuity, extending from the tympanic cavity to the vestibule. The edges of the bone were apparently normal and made the impression of a fracture rather than a result of a necrotic process. The cleft was filled with a finely granular coagulated material and pus. There was no evidence of granulation tissue either in this fissure or in the breach in the stapes. The vestibular epithelium was nowhere recognizable. It was replaced by a coating of granular, partly lumpy material. The periosteal lining was thickened by the formation of new connective tissue and the infiltration of round cells, and was firmly adherent to the bone. These changes were more marked in some areas than others, forming nodules on the surface. A few small areas were seen where the fibrous membrane was entirely absent, and the bone covered directly with a granular material containing a few pus cells. Similar changes were found in the semi-circular canals. The membrane of the fenestra ovalis was

intact, but was covered on both sides with clotted fibrin and pus.

In the cochlea the scala tympani contained coagulated masses made up of pus cells in a meshwork of fibrin, especially on the lower wall of the canal. The epithelial lining of the cochlea was partially destroyed. A portion of it was normal, and in some portions the cells were enlarged and cystoid. The scala vestibuli was practically normal. In the ductus cochlearis the epithelium over the spiral ligament was thickened by an increase in number and size of the cells.

In this case the nerve was again the seat of the most extensive changes. In the trunk as well as in the branches of the nerve, large accumulations of variously shaped cells, from oval to triangular, were found deposited between the fibres. The cells were peculiar in their structure. They were rather large and had a well-defined cell membrane, with clear, colorless contents, which was divided into one or more compartments by delicate partitions arising from the capsule and coming together at the nucleus, which was usually situated close to the cell wall. Most of the cells had a single nucleus, although many were seen with two nuclei.

It is of interest to note in this case, as in the previous one, the point of infection of the internal ear at the oval window. However, not by the inward growth of granulation tissue and necrosis of bone, as in the previous cases, but by the extension of a suppurative process through a breach in the bone, the latter, most likely, a fracture sustained during the operation. The preponderance of a purulent process with epithelial destruction, and the formation of granular material, and but little tendency to the formation of granulation tissue, were the prominent features of this case. Evidence of an old inflammatory process, with formation of new connective tissue was found only in the semicircular canals and the vestibule.

The changes in the nerve were evidently the product of a recent inflammatory process, as there was no new connective tissue to indicate an extended inflammation. The peculiar cells found in the nerve trunk resembled those of the previous case, though they were uniformly smaller and contained

a smaller number of nuclei. The early appearance of these cells, before the formation of fibrous tissue, is of interest.

CASE 5.—Age thirty-seven ; cholesteatoma of right middle ear ; cerebellar abscess ; operation ; death.

Sections of the tympanic cavity disclosed a thick coating of its walls, made up of a cholesteatomatous formation containing numerous cysts, many of which contained giant cells.

The scalæ of the cochlea, the ductus cochlearis, and the separating membranes were all coated with a peculiar granular material containing isolated large nuclei. It was thickest over the ligamentum spirale, where it formed a nodular elevation. Peculiar and characteristic changes had also taken place on the basilar membrane. Corti's organ was entirely replaced by a mass made up of a great number of small irregularly oval or round hyaline bodies. They were closely crowded, and filled the space between the basilar membrane and the membrane of Corti. The oval bodies were homogeneous in their make-up, only a few of them containing nuclei in their centre. Round cells in mass were found at only one point in the internal ear, the space at the extremity of the angle between Reissner's and Corti's membranes being filled with them.

In this case the acoustic nerve was again the scene of extensive changes, more so in the cochlear than in the vestibular division. The fibres were crowded apart by the deposit of a finely granular material containing numerous round cells and extravasations of blood. In some portions of the nerve the individual fibres were separated and in others the bundles. These changes could be traced far into the trunk of the nerve. It was noticed that the newly formed material was most abundant around the blood-vessels. The smaller branches of the nerve in the labyrinth were surrounded by a light hyaline material, which was contiguous with the surrounding bone.

A significant anatomical feature of this case was the abundance of hyaline and finely granular deposit in the labyrinth and the absence of pus or granulation tissue, with the exception of the small quantity in the angle between Reissner's and Corti's membranes, indicating clearly a degenerative process. The infiltration of the nerve with round cells was indicative of a neuritis ; and the absence of fibrous formation, of the acuteness of the inflammatory process.

The peculiar hyaline globular bodies on the basilar membrane can be explained by a hyaline degeneration of the cells of Corti's organ, as none of the normal cells remained, and as a number of the bodies contained nuclei. They were found at no other portion of the inner ear.

CASE 6.—A temporal bone, preserved in alcohol for operative practice, showed signs of an old purulent otitis and was decalcified and prepared for microscopic study.

The mucous membrane of the middle ear was very much thickened by an unusually prolific formation of fibrous tissue and cell infiltration in the submucous coat. The surface was covered by the normal, well-preserved columnar epithelium.

The only abnormalities noted in the internal ear were in the cochlea. There was a very thin deposit of finely granular matter on the epithelial lining of all of the compartments of the spiral canal, and the spiral ligament was marked throughout its course by a nodular protuberance. Histologically this swelling was the result of changes in the histological structure of the sub-epithelial tissue. There had been a proliferation of the connective tissue of the spiral ligament, which protruded into the ductus cochleariformis, pushing before it the normal epithelium of the surface. The changes in the scala media in this case were similar to those of the previous one, and must be construed as the result of a circumscribed inflammation of the connective-tissue stroma of the spiral ligament.

CASE 7.—Male of thirty-six years ; was first seen in an advanced stage of pulmonary phthisis. He had otorrhœa on the left side, with sagging of the posterior superior wall of the meatus, and exuberant granulation tissue filling the tympanic cavity. Hearing on this side had been destroyed. In addition to this there was total paralysis of the left facial nerve. In standing with his eyes closed, the patient would show a tendency to fall to the affected side. The tubercular process had also involved the buccal cavity and larynx. Owing to his feeble condition, operative measures were not advised. Death followed a month later.

At the autopsy it was found that the dura on the left side, corresponding to the second turn of the cochlea, contained two small

white deposits, evidently of a tubercular nature. The pia mater on the left side also contained tubercular deposits, especially in the middle cranial fossa. The anterior surface of the petrous bone was marked by several discolored areas over which the dura was perforated. The surface of the occipital lobe and the cerebellum, on the left side, was covered in parts with a thin deposit of foul pus. Tubercular deposits were also found in the respiratory tract, the spleen, and the kidneys.

Microscopic Examination.—In the tympanic cavity the mucous membrane was entirely absent, the naked bone being exposed in parts, and a large extent of the surface covered with granulation tissue. A few masses of granular material, with central giant cells, were also found in contact with the bone. The greatest part of the bone surface was irregularly pitted and covered with pus, finely granular material and fragments of necrotic bone. The ossicles, with the exception of a small fragment of the foot-plate of the stapes, were absent. They were replaced by granulation tissue, intermingled with a granular, apparently cheesy, material. This partially degenerated granulation tissue could be traced into the vestibule through a rather large irregular defect in the bone just behind and communicating with the *fenestra ovalis*. It formed a coating over the rough bony edges of the perforation. The tissue was extremely vascular and contained some connective-tissue fibres. Toward the interior of the vestibule it became more caseous, and contained a number of giant cells. It occupied only a small portion of the cavity, the entire mucous membrane being intact. However, a marked proliferation and hyaline degeneration of the epithelial cells had caused thickening of the membrane. The peri- and endo-lymphatic spaces contained a semi-solid transparent hyaline exudate. In the course of the horizontal semicircular canal a small necrotic area was found, the breach in the bone being occupied by granulation tissue. The changes in the membranous semicircular canals differed in their different portions. Some sections would show complete occlusion of the lumen, with a cheesy mass and granulation tissue, while other portions contained circumscribed nodules, with broken-down interior (tubercles). Other sections, again, showed involvement of the bone. The surface was ragged, and the niches filled in with granulation tissue. Some of the larger necrotic areas were crescentric in shape and contained, besides the round cells of granulation tissue, a number of osteo-

blasts. In some portions of the canals normal epithelial lining was present, only slightly thickened by an increase of its fibrous elements. In these portions the lumen contained a glassy hyaline material.

In the cochlea, products of an inflammatory process were noticed only on a small portion of the basilar membrane, and in the scala tympani. The latter was filled with a colorless homogeneous hyaline substance in which isolated delicate fibres could be detected. Towards the bone there was some granulation tissue, and in direct contact with the bone and filling out its irregularities, a mass of finely granular material, probably of a cheesy nature. At the posterior edge of the foramen rotundum there was a rather large necrotic area in the bone, and the membrane of the fenestra was replaced by a cushion of granulation tissue, which had partly undergone cheesy degeneration. The basilar membrane with Corti's organ had been replaced by similar tissue.

The auditory nerve showed no pathological changes; but the facial was extensively involved. It was detached from its surrounding bony wall, and its fibres separated by some granulation tissue and more cheesy material, in which irregular round nodes, evidently tubercles, could be seen.

Analysis of Findings.—This case was clearly one of tuberculosis. Diagnosed as tuberculosis of the tympanum during life, it was corroborated by the macroscopic findings at the autopsy, and by the microscopic examination. The extensive destruction of bone in the ear, in addition to evidence of tuberculosis in other portions of the body, was enough to make the diagnosis; but there was in addition to this the typical cheesy degeneration and the isolated tubercular nodes.

The disease had spread from the tympanic cavity to the internal ear through necrotic areas in the bone around both fenestrae and in the horizontal semicircular canal.

The slight changes in the internal ear is a fact worthy of special note. At each of the avenues of infection the disease extended over but a slight area, the more central portion of the internal ear, including the auditory nerve, showing little evidence of inflammation.

The involvement of the facial nerve is another interesting

feature of this case. The changes were partly the product of a recent inflammation, and in portions were easily recognizable as tubercular. The fact that they were most marked where the nerve passed through the tympanum, leads to the conclusion that the infection of the nerve took place at that point.

Although necrosis of bone was noted in the other or simple cases of otorrhœa, they were characterized more by a proliferation of tissue. In most of them there was an abundance of fibrous-tissue formation and the formation of new bone. In the last or tubercular case there was no tendency to the formation of new bone, and the newly formed fibrous tissue was scant, and was mostly transformed into cheesy material.

It might be stated that Habermann has previously made the observation that tubercular cases could be recognized by their great tendency to bone destruction.

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Description of Plates.

Fig. 1, Case 1. Section through cochlea and nerve.

Fig. 2. The same case. Perforation through stapes: (a) margin of window posteriorly normal, anteriorly carious; (b) stapes, posterior part of the plate with posterior branch; (c) annular ligament.

Fig. 3. The same case. Semicircular canal. Bony canal is occluded with hyaline, vascular connective-tissue; the membranous canal in the upper and right-hand corner as a very small epithelial tube filled with hyaline material.

Fig. 4, Case 3. A cellular part of the auditory nerve.

CONTRIBUTION TO THE PATHOLOGY AND TREATMENT OF DISEASES OF THE AC- CESSORY NASAL CAVITIES.

BY DR. F. ROEPKE, OF SOLINGEN.

Translated by Dr. ARNOLD KNAPP, of New York.

I.—Three cases of caseated empyema of the accessory sinuses.

a.—*Of the Ethmoid Cells.*

In November, 1893, S. P., thirty-five years of age, consulted me on account of a fetid discharge from the right nostril, a dull pressure in the head, occasional vertigo, and spots before the eyes. His complaint interfered considerably with his work, and though he had formerly been a man of very passive disposition, he had recently become unusually irritable and had had a number of misunderstandings with his fellow-workmen. The right side of the nose, in its upper part, was filled with granulations and fetid pus. After the granulations had been removed a white cheesy mass occupied the middle meatus. The probe detected that the ethmoid cells bordering on the naso-frontal duct were filled with this mass. The cheesy masses were removed with a sharp curette. A cavity as large as a walnut was thereby exposed and carefully packed with iodoform gauze. The suppuration ceased after two weeks and the patient was free from all symptoms. A half year later he returned; the condition had remained healed.

Mrs. B., seventy-three years of age, consulted me in July, 1900, on account of severe headache and occlusion of the right nose. After having removed the polypi, which completely occluded the right half of the nose, the unusually dilated atrophic nasal cavity on that side was found to be filled with cheesy yellowish-white masses. The masses were curetted and were very

fetid. After irrigating the nose, the probe detected that a cavity existed in the anterior ethmoid cells. The walls of this cavity were covered with granulations. After their removal recovery quickly followed.

b.—Of the Maxillary Antrum.

W. J., thirty-six years of age, consulted me at the end of September, 1900. He had suffered from a discharge of pus from the right side of his nose for five years, together with a sense of pressure in the right cheek and occasional attacks of vertigo. During the past month the symptoms had become very much aggravated, the headache had become almost unbearable. The right half of the face had been swollen for a week, and there was a continuous discharge of fetid pus from the right nostril. The patient was an emaciated man, with a very unpleasant odor. The region of the right maxillary antrum was swollen and tender; over the right nasal bone there was a small fluctuating tumor; the right nasal cavity was filled with granulations and inspissated pus. After removing the granulations, the lateral wall of the nose was found to be carious. On account of the severe symptoms, the superior maxillary cavity was opened on the same day. A broad opening was made through the canine fossa. The anterior wall was found very thin, the entire cavity completely filled with cheesy, bad-smelling, yellowish-white masses, which were removed with the curette. The lateral wall of the nose is badly necrosed and covered with granulations. The other walls presented uniform thickened mucous membrane. The necrotic part of the lateral wall was removed with bone forceps and granulations carefully curetted. The abscess on the right nasal bone was opened and a small sequestrum evacuated. Microscopically, the cheesy contents of the maxillary cavity consisted of amorphous masses without any epithelial structures. Usually, after treatment granulations had to be removed from the middle meatus. Otherwise recovery took place without incident. After four weeks, the large cavity was dry, the small abscess wound was healed. The patient himself irrigates the cavity, and would not permit the opening in the canine fossa to close for fear of a recurrence. Six months ago I had occasion to examine the patient again. The opening in the upper jaw was large enough to admit your small finger; the cavity was entirely healthy, and there has been no further discharge from the nose.

The current literature on this subject has only recently been collected by Stida in these ARCHIVES. I simply would like to add that the caseation in all three cases was probably due to obstructed drainage. The experience of other authors, that these morbid foci quickly heal after removing the cheesy mass, is confirmed by my own case.

2.—A case of pneumatocele of the frontal sinus.

W. B., eighteen years of age, consulted me in 1898. He had suffered from headache, especially over the right eye, and from vertigo on bending forward, for a period of two years. The pain had become more severe for the past four months, and a distinct swelling appeared over the right eye. While a child, he had suffered greatly from coryza and pain in the ears, though he did not remember to have had any unusual amount of discharge from his nose. An injury of the frontal sinus had not occurred. Syphilis was denied. On examination, the anterior and lower wall of the right frontal sinus was distinctly distended and tender. The middle turbinal was cystic and dilated, occluding the middle meatus. The nasal cavities in every other respect were normal. There was no sign of suppuration. I suggested to the patient first removing the osseous cyst in the middle turbinal. After this had been done, the cavity in this turbinal was found absolutely empty. Various attempts to probe the naso-frontal duct failed. The frontal sinus was then operated upon. The anterior wall was as thin as paper. On breaking through the mucous membrane, air escaped with a whistling noise. The cavity appeared to be lined with perfectly normal mucous membrane; there was no pus. The anterior wall was then resected to permit a probing of the naso-frontal duct from above. This duct was found to be completely obstructed. A new opening was made with a sharp spoon, and a strip of gauze was passed from above into the nose. The external wound was sutured and a bandage applied. After three days the gauze was removed from the nose. The external wound had healed primarily. The patient's symptoms all disappeared. Six months after the operation the patient was free from all symptoms.

The occlusion of the naso-frontal duct in this case is responsible for the unusual distension of the frontal sinus.

The occlusion was probably the remnant of an inflammatory infection of the right half of the nose. The existence of an osseous cyst in the middle turbinal on the same side can also be interpreted in this sense, inasmuch as inflammatory irritations surely existed a number of years ago. A similar case has been reported only by Posthumus Meyjes.

3.—A case of fetid purulent frontal sinus empyema, with the production of crusts, in a pronounced case of atrophic rhinitis.

C. S., sixteen years of age, came on account of an odor and discharge from the nose, severe pain over both eyes, and occasional attacks of vertigo. A pale, scrofulous girl presented glandular swellings in the neck, a broad nose, and badly retarded development. The anterior and lower walls of both frontal sinuses were tender. The unusual dilated nasal cavities were filled with fetid crusts. After cleansing the nose, the middle and lower turbinals were found atrophied, and pus appeared in the region of the middle meatus. The probe could be introduced without any difficulty in both frontal sinuses. Daily irrigations of the nose and of the frontal sinuses, however, did not relieve the condition. In the beginning of July, both frontal sinuses were operated upon radically by a modified Kuhnt's method. The septum between both frontal sinuses was found perforated; the mucous membrane was partly detached from the walls and was covered with the same dirty, fetid crusts which existed in the nose. The nasal ducts were so broad that one could have introduced an ordinary lead-pencil. They also contained purulent crusts. After a careful removal of the mucous membrane from the frontal sinus, the cavity was again cleansed and packed with iodoform gauze. The external wound was sutured, except at one place where it was left open for the gauze. On the day following the operation the odor from the nose had disappeared. The packing was removed after three days and was not again inserted. There was a slight secretion from the nose; the formation of crusts on the atrophic nasal mucous membrane was not excessive. The external wound healed primarily. In the beginning of August the patient returned to work. After two weeks she experienced severe headache. The scar of the operation was red and bulging, with a distinct fluctuation. Both nasal cavities contained odorous pus and crusts. The scar was opened, and it was found that the flap consisting of the skin and

the periosteum had become elevated from the frontal sinus wall. The cavity thus produced was filled with pus and crusts. After daily irrigations, the suppuration ceased in two weeks. At the end of November, another obstinate relapse, with the same symptoms, occurred. After this attack had been cured, the patient determined to give up her factory work, and she has had no relapses.

It seems to me that this is a case of atrophic rhinitis occurring on a scrofulous basis. The excessive formation of scabs was facilitated by the dust in the factory. This had extended to the frontal sinuses through the unusually dilated nasal duct. In addition to the scrofulous disposition of the patient, the dust (metal and chalk) in the factory was also responsible for the re-infection.

4.—A case of frontal-sinus suppuration following a pistol wound ; extraction of the revolver bullet from the naso-frontal duct.

The patient, twenty-three years of age, had attempted in January of this year to commit suicide, and had discharged six shots from a revolver at his head. Immediately after the attempt, two bullets were removed from the left frontal sinus. The wound was at first healed, but later opened again and discharged pus. Beyond a moderate sense of pressure in the left half of the skull, he has been in good health. On the day of the attempt at suicide, a considerable amount of blood came from the left side of the nose, but there has never been any pus. I saw the patient first on March 4th. A fistula led directly over the eyebrow through the anterior wall of the left frontal sinus. Putrid pus exuded from the fistula. The nose was normal. The anterior wall of the frontal sinus was exposed. The walls of the fistulous tract were softened and covered with granulations. The frontal sinus was filled with granulations and purulent masses. The anterior wall was removed sufficiently to overlook the entire frontal sinus. The granulations were then curetted. No splinters of bone or bullet were to be seen. As the granulations seemed to be situated principally at the entrance of the naso-frontal duct, we attempted to pass a probe, and immediately encountered a foreign body which seemed to be wedged in the duct. With a strong pair of forceps we were enabled to remove this foreign

body, which proved to be a flattened revolver bullet. This was, of course, the cause for the frontal-sinus suppuration. Inasmuch as the naso-frontal duct was occluded, the pus could not find its way into the nose and had to pass through the original path of the bullet, through the anterior frontal-sinus wall. The patient is still under treatment.

REPORT OF THE TRANSACTIONS OF THE NEW
YORK OTOLOGICAL SOCIETY, MEETING
OF JANUARY 26, 1904.

BY DR. ARNOLD KNAPP, SECRETARY.

DR. J. L. ADAMS, ACTING PRESIDENT, IN THE CHAIR.

Dr. QUINLAN reported on **three patients living in the same house who suffered from suppurative otitis and complicating mastoiditis at the same time**. The complications in these three cases were of an unusual severity.

Dr. DUEL reported on a case of **paroxysmal cough** of nine years' duration. The patient, a boy fifteen years of age, had his tonsils and adenoids removed a year ago. A suppurative condition of one ear and a large cholesteatomatous mass were found at the same time. The mass was removed through the canal and the cough stopped for two months. He returned again in October and consented to have the ear radically operated upon. After the radical operation, in which Thiersch grafts were used, the cough seems to have been permanently arrested. The doctor explains the coincidence of the cough and the auricular lesion by pressure exerted upon the distribution of Arnold's nerve in the external auditory canal.

He also spoke of a lady of forty years of age, who had a very similar cough for twenty years, for which she had been treated everywhere. The entire respiratory tract had been carefully gone over by a number of competent authorities. The cough would come on in paroxysms, during which the patient nearly vomited.

After a careful examination of the nose and throat, everything was found normal. Remembering the preceding case, Dr. Duel examined the ears. On touching the distribution of this nerve

in one ear, no reflex was produced. On, however, probing this same area in the other ear, a typical paroxysm of coughing could be produced. He proposed to the patient to treat the area of distribution of this nerve radically by removing it, after resecting the part of the external auditory canal, and inserting a skin graft.

Dr. KENEFICK had seen the same patient and was very much impressed by the regularity with which the cough could be produced on irritating this particular area in the canal. He, however, doubted the efficiency of the operation, inasmuch as some cause in the chest could not be excluded.

Dr. ADAMS inquired whether a difference of temperature or some other peculiar feature had been noticed in the beginning of the paroxysms?

Dr. DUEL thought it was due to a disturbance in the circulation, as it always came on in the recumbent position.

Dr. ARNOLD KNAPP inquired what the area of distribution of Arnold's nerve was—especially what the sensitive area was—in this patient.

Dr. DUEL defined this area as occupying the junction of the posterior and superior wall of the auditory canal, where the membranous and bony canal meet.

Dr. MAY had seen a patient who would suffer from an attack simulating laryngismus stridulus, which would always be brought on by laughing.

Dr. BERENS thought that an irritation of the vagus from the stomach or the chest must be excluded before assigning the cause of the cough to be in the external auditory canal, inasmuch as no local change had been noticed in that locality.

Dr. COX reported on a case of **erysipelas** arising from the external auditory canal after a growth had been removed which made symptoms **very suggestive of mastoiditis**.

Dr. BERENS had had a similar case, though not occurring after an operation in the ear. There was a very large swelling behind the ear, with a history of discharge through the canal. On opening the mastoid he found it absolutely normal.

Dr. BRANDEGEE reported on a case where **symptoms of mastoiditis were caused by a furuncle in the canal**. There was considerable oedema and bogginess over the mastoid; the canal was stenosed. After making his incision, the cause of the swelling was found to be furuncle. He thought that in some cases it

was very difficult to make a correct diagnosis, and that it was better to operate when in doubt.

Dr. HALSTEAD had seen a patient who presented a great deal of swelling over the mastoid region. On opening the mastoid, it was found to be normal. The patient was a diabetic and subsequently developed a large swelling, carbuncular in character, in the neck, and died in coma shortly after.

Dr. HARRIS thought that it was not quite right to suggest an operation in cases of doubt; he thought that a delay of twenty-four hours very frequently solved the correct condition of affairs.

Dr. LEWIS reported a case of **hyperpyrexia in tympanomastoiditis**. The patient, thirty-three years of age, had suffered from a severe coryza and an ethmoiditis for three weeks before he had seen her. During this time she had been much annoyed with tinnitus and deafness. There was no discharge from, nor pain in, the ears; no mastoid tenderness nor oedema. Two days before he had seen the patient, temperature began to rise, and at the time of his first visit it was 105.5° F. The only aural symptoms that were present at the time were a slight redness along the manubrium mallei, a very slight bulging of the posterior segment of the membrana tympani in the left ear and of the upper segment of the membrana tympani in the right ear, and a peculiar yellow hue of both membranæ tympani. A diagnosis of middle-ear infection was made because of the deafness, tinnitus and temperature, associated with the peculiar yellow appearance of both membranæ tympani. A paracentesis was made of each membrana tympani, and on an examination being made of a smear from each knife, a pure streptococcus infection was found to be present in each ear. The temperature fell to 103° F. by noon, followed by a rise to 105.5° F. by evening. Although there were no signs of mastoid involvement, it was thought best to open both mastoids because of the high temperature and the type of the infection.

The cortex of each mastoid process was hard, but the cellular structures beneath were partially softened, and filled with granulation tissue and some pus; more pus was found in the deeper cells than elsewhere. After the operation, the temperature fell to 101° F., but rose to 103° F. the second day, and the third day it ranged between 100° F. and 101° F. At present the right mastoid wound is healed and the left shows every indication of being healed in a very short time.

Dr. MCKERNON remembered having seen cases which were similar, where the only guiding mark seemed to be the temperature.

Dr. HARRIS spoke of a double suppurative otitis and pneumonia following upon an operation for the removal of adenoids in a child, in which ether anaesthesia had been given.

Dr. MCKERNON reported upon two children upon whom he had recently successfully operated for **primary sinus thrombosis of the jugular bulb.** The cases were similar, inasmuch as though the inflammation in the ear was well marked and the temperature was distinctly pyæmic there were no external mastoid symptoms, and upon operating the mastoid processes in both cases were found perfectly normal. Upon exposing the sinus in the first case, the sinus was found black. In the second case, it was impossible to tell which ear was the offending one. In one ear, however, there was a small granulation in the posterior inferior quadrant, so the sinus of that side was exposed and found to be yellowish-green. After incision a clot was removed, followed by straw-colored serum. In both these cases Dr. McKernon thought the infection started in the bulb, as most of the pathological changes were found in that part of the sinus, and in both cases the jugular bulb encroached unusually upon the middle-ear cavity. He thought that the infection had come directly from the tympanum.

Dr. LEWIS inquired why the jugular had not been ligated.

Dr. MCKERNON said he had been able to obtain free hemorrhage from below, and did not ligate the jugular vein unless the clot in the sinus was disintegrated or purulent.

REPORT OF THE TRANSACTIONS OF THE SECTION
ON OTOLOGY OF THE NEW YORK ACADEMY
OF MEDICINE.

MEETING OF DECEMBER 10, 1903. EDWARD B. DENCH, M.D., IN
THE CHAIR.

EXHIBITION OF NEW INSTRUMENTS.

Dr. KERRISON presented a set of bone forceps designed especially for use in the **radical operation** for chronic suppurative otitis media. In explaining their advantage over the older rongeurs, he said they could be introduced into a narrow canal, like the bony meatus, and would cut laterally or from within outward. In using these instruments, he found it easier to remove first the roof and posterior wall of the meatus and then the mastoid cortex covering the antrum. These instruments attack the bone from the tympanic end and cut from within outward. The doctor said this method of reaching the seat of the disease is safer, from the fact that the bone is cut in a direction away from the facial nerve, and also from the fact that after the preliminary steps of the operation the tympanic landmarks are thoroughly exposed to view. The instruments are made by Ford.

Dr. BERENS said that he had used the instrument and found it of much value in radical operations on the temporal bone, and that it materially lessened the danger of wounding the facial nerve, and made injury to the external semicircular canal impossible. Dr. Berens had found it very useful in operating on the accessory sinuses of the nose.

Dr. DUEL spoke of the great feeling of comfort experienced with the instruments in removing the bridge of bone in the radical operation. He said: "You are always working away from the facial nerve, and you can rapidly map out roughly the field

which we usually excavate in the radical operation." Dr. DUEL also spoke of the instrument as being a great time-saver.

Dr. DENCH said that some years ago he devised a similar instrument for the removal of a portion of the upper bony meatus wall in ossiculectomy, somewhat after the pattern of the old Hartmann instrument, which the instrument of Dr. KERRISON resembled. He said that he wished to sound a note of warning: that he had seen one case in which the instrument was used, in which a complete facial paralysis followed. He said that it was not absolutely safe; that in cutting well posteriorly with any instrument of this kind it is possible to injure the facial nerve. He considered, however, that the instrument was valuable and that it would shorten the time necessary in performing the radical operation.

Dr. KERRISON said that he could conceive of no possible anomaly in the course of the facial nerve which would render it liable to injury by these instruments; and that he could not see how an instrument of this kind could possibly injure the nerve unless it were jammed into the inner tympanic wall, which, of course, should be avoided.

Dr. RICHARDS exhibited a **set of curettes**, explaining that they differed but little from the ordinary curette used, except that the angle is bent back—the ordinary curette is bent forward. By using the ulnar portion of the hand as a fulcrum, and simple wrist movement, the curette, being held vertically, or nearly so, slides over the bone much more easily, and does not hang.

Dr. S. MACCUEN SMITH, of Philadelphia, read the paper of the evening, entitled "Middle-Ear Disease in its Relation to Metastatic Abscess of the Liver," which is printed in full on page 87 of this number.

Discussion.—Dr. MCKERNON stated that he had had no experience with cases of abscess of the liver resulting from suppurative disease of the middle ear, but that he had had several cases of metastatic abscess in other portions of the body, resulting from suppurative disease of the middle ear. He cited one case, that of a man of fifty-four, where metastatic abscess of the intestines took place, following an operation for acute mastoiditis following acute otitis. Five days later the lateral sinus was opened and a septic thrombus exposed. Six days later there was a large evacuation of pus from the intestines. Previous to this evacuation

there was a chill, then a sudden rise of temperature; a great amount of pain over the abdomen. The patient was much depressed. He was given, internally, the ordinary medication for movement of the bowels—calomel followed by a saline. Quite a large amount of pus was observed in the stools. The patient was immediately put on an internal medication of bichloride of mercury, $\frac{1}{10}$ grain every two hours, for ten doses. After that, the administration of the bichloride was made smaller— $\frac{1}{20}$ grain every four hours. The intestines were washed out, the flushing being done every four hours. The case made an uneventful recovery after three days of evacuations of pus from the intestines.

Two other cases which afterwards came under my observation were: a man of thirty-two and a girl of sixteen, both following sinus operations, where a septic clot was evacuated. The histories were practically the same as the before-mentioned case. They also recovered. The internal administration of the bichloride of mercury and high rectal washing were instituted.

Another case was that of metastatic abscess of the second finger of the left hand seven days after the evacuation of a septic clot from the sinus, and the ligation and resection of the internal jugular vein. Incision and packing cured the case.

Also, a case of metastatic abscess of the groin, following an affection of the middle ear, mastoid, and sinus. In that case, the accumulation of pus did not take place until fourteen days after operation. At first he did not know whether the patient had a phlebitis, or whether it was simply an accumulation of pus. On the second day hot fomentations were used; the temperature remained high, and the man had chills. The abscess was incised, and pus evacuated. The temperature went down to normal, and the patient recovered.

Another case, following a sinus involvement, where the abscess was in the axillary region on the right side. The usual course was pursued, the abscess was evacuated, and the temperature dropped. The patient recovered.

Another point which Dr. Smith spoke of in his last case was that an exposure of the jugular vein was made, and, as far as the eye could see, there seemed to be no involvement. It was, therefore, deemed best to leave it alone. This reminded Dr. McKernon of a case seen with Dr. Whiting. There was no apparent inflammation after exposure of the jugular vein, yet the walls of the vein contained large quantities of streptococci. Dr.

Dixon examined the pathological specimen, and reported that the whole coat of the vein itself was infiltrated with this material.

Dr. McKernon said, in conclusion, that if there was evidence to go by, and the trouble could not be located anywhere else, we were justified in the ligation and resection of the jugular vein. In his last case the condition was similar to that above-described. Though death took place afterwards, the whole lining membrane of the vein itself was infiltrated with this peculiar form of infection.

Dr. LEWIS said that he also had never had a case of metastatic abscess of the liver, but that he had a number of cases in which the abscess was located in some other portion of the body. He cited a case of double mastoiditis which he had seen a number of years ago in a young child, following measles. For a period of two weeks the child had a temperature varying from 99.5° to 105.5° F.; on two occasions it touched 106° F. Both mastoids had already been operated on by the doctor. The sinus was not exposed, although he thought it advisable to do so. The child was the daughter of a physician who opposed further operation. The child was seen in consultation with Dr. Whiting, who also thought that the sinus should be exposed, but Dr. Weir advised a few days' delay. Not even then would the father consent to further interference. During these two weeks a chill followed by high temperature occurred on an average of every sixteen hours. The child got well, and the only manifest metastatic condition was a phlebitis over the femoral vein on the left side. It did not go on to suppuration. Dr. Lewis reported another case in which a phlebitis developed in one of the tibial veins. That did not go on to suppuration either. The temperature was high and there were chills. This patient also got well.

He thought that the radical position which otologists take in cases of this character was an advisable one; that chronic suppurative ear trouble should not be allowed to run on indefinitely without operative interference. As an illustration of the serious nature of such cases, the doctor spoke of the case of a man, eighteen years of age, in good physical condition, whom he saw on the third day after his initial chill. The patient had had a scanty discharge from the ear for a number of years. On the third day after the chill he came to the hospital with mastoid and jugular tenderness. The mastoid was opened and granulations were found on the sinus. The sinus was exsected, but before an

opening was made into it an incision was first made in the neck and the jugular vein was exsected throughout its entire length. Then the sinus was opened and a large septic clot removed. Notwithstanding the fact that this operation had been done at so early a date as the third day, the man got up a double septic pneumonia on the fifth day and died on the thirteenth day following the operation. The clot in the jugular vein was not infected, but the vessel walls were.

Dr. BERENS thanked Dr. Smith for calling attention to the evils likely to arise from chronic or acute suppuration of the middle ear. He mentioned the fact that Dr. Burnett had reported a case of abscess of the liver from chronic suppuration, this being quoted in Dr. Luc's recent book. He stated that it is claimed by some that the general circulation is affected direct through suppuration in the middle ear, and that these infections of the general circulation are infections through the walls of the veins, that the cocci are taken up and deposited in various locations—whether it be in the liver or in and about the joints, especially about the tendons, makes no difference,—and compared the condition to gonorrhœal rheumatism. Dr. Berens said that he had not seen a case of abscess of the liver from middle-ear suppuration; that he had seen these inflammations about the joints, inflammation of the muscles, of the intracellular muscular tissue, with and without pus formation, get well *with* incision and without it. He said that he believed cases of parietal clot formation would cause the same condition; that it was a well-known fact that cases of lateral-sinus thrombosis produce metastatic abscess of the lungs, but he doubted metastases to the liver being possible in the same manner. The doctor said that it was argued that these were cases of the direct breakage of the clot, and a deposit of it in the pulmonary circulation, while direct absorption of cocci by the blood without clot formation would permit of septic infection in any part of the body. He said that Dr. McKernon's second case would seem to confirm that view, in that the walls of the sinus were infiltrated with the various cocci; and that it was only reasonable to suppose that if the walls are infected the circulation will rapidly take up the infection. He thought the lungs would filter out any clot, hold it fast, and thus prevent its passage to the liver or elsewhere.

General Discussion.—Dr. LEDERMAN spoke of a case of chronic suppurative otitis which had come under his observation, in

which there was a marked destruction of the mastoid, also sinus and jugular thrombosis. The jugular was resected and the patient seemed to get along fairly well for about a week, although at time of operation subcutaneous infusions had to be administered. About the sixth day the temperature suddenly rose to $104\frac{1}{2}$ ° F., and the man complained of pain in the abdomen over the right side. The patient was transferred to another hospital. There was some doubt at the time whether or not an appendicitis was going on. Dr. Elliot found what he thought to be an acute inflammatory cyst of the liver. At first glance it appeared to be very similar to an echinococcus cyst. No bacteria was discovered to account for the infection, although it contained quite some fluid, which was rather clear. The patient recovered. Cultures proved negative.

Dr. DIXON said that he had examined a large number of clots in cases of thromboses of lateral sinus and internal jugular, and that it was very rare indeed to find any micro-organisms in the clot itself—they are almost invariably in the walls of the veins. He said that he had had no experience in metastatic abscess of the liver.

Dr. SMITH, in closing the discussion, said, in answer to Dr. Lewis's question as to the location of the pain, etc.: The pain in the neck and shoulder was always on the right side.

In answering Dr. McKernon with reference to the passage of pus and the very frequent movement of the bowels, he said: "I am not sure that such a condition existed; it was not mentioned in the records, so I presume it did not occur. As regards the ear which is involved, I do not know that the **right** ear was always involved. I do know, however, that in two cases both ears were suppurating.

Dr. Berens speaks of the infection of other organs. I believe it is generally accepted that metastatic abscess resulting from the ear, if not very common, certainly does occur rather frequently, and the point in connection with the liver is—that the infection in order to reach the liver must go in a reverse direction of the current of the blood. Hartmann injected small particles of wheat into the sinus and veins. Those particles were too large to go through the capillaries and yet they were found in the body. It does seem curious, but that fact has been pretty well established.

Inflammation of the liver is no doubt more or less common

as a secondary inflammation, but as the primary inflammation from the suppuration of the ear it certainly does seem rare.

In the second case the jugular vein was seen at the post-mortem examination. There was no reason to suppose that there was any trouble with the jugular whatever during life, although pain in the neck was severe. Evidently it was not involved, so far as we could tell.

MEETING OF JANUARY 14, 1904. DR. HERMAN KNAPP IN THE CHAIR.

Dr. KERRISON, in speaking of the bone forceps which he had exhibited at the previous meeting, said that at that time he had presumed this instrument to be the only one of its kind in existence, but that his attention had recently been called to two instruments made in Germany, which were of somewhat similar construction, but which presented differences rendering them unavailable for the heavier work for which his forceps were designed.

PRESENTATION OF CASES.

Dr. SMITH presented for J. D. Richards **a case of squamous-celled epithelioma of the auricle**, saying that the trouble had existed for something over a year, but that it had materially increased in size during the last four weeks. A section had been removed and examined, showing squamous-celled epithelioma. The X-ray had been applied eight times, the time of each application varying from five to ten minutes. The tumor had increased daily in size, and there seemed to be some metastasis of the neighbouring gland. Dr. Smith said that the physicians who had examined the patient had been able to determine a small gland between the ramus of the jaw and the tip of the mastoid process, which had occurred in the last two weeks. The X-ray seems to have had no beneficial effect. He expressed the hope that it would come out in the meeting whether it would be best to continue the X-ray, or submit the patient to radium tests. The man was apparently in good physical condition, and the complete removal of the growth could be satisfactorily accomplished by surgical methods.

Dr. HARRIS cited a case which had recently been reported at the New York Otological Society by Dr. Wilson of Bridgeport —an epithelioma of the auricle, or, if not that, of the auditory

canal. Dr. Wilson had considered the case cured by X-ray, but shortly after the discontinuance of the X-ray treatment the growth returned. Recently, it has been treated with radium, with surprising results, the patient having had a large number of treatments given within short intervals of time. This result was regarded as much more brilliant than that achieved by the X-ray. There is no sign of the growth at the present time.

Dr. TOEPLITZ read a paper entitled "Neglected Education of the Partially-Deaf Children."

The education of children with impaired hearing is neglected, as this misfortune is usually not noted. Hardness of hearing means not only a decrease in the hearing faculty but, in the growing child, a retarding influence on all the functions intimately connected with the acoustic sense, such as feeling, emotion, and, most of all, speech. The defects in hearing after aural lesions were then described.

The impeded psychic development should be overcome. Pedagogic treatment should begin early. The various means by which this is accomplished are mentioned. The further education of these children should aim to develop the mind as much as possible, and for this a close co-operation of the physician and educator is essential.

Dr. MAXIMILIAN P. E. GROSZMANN also read a paper, which was entitled "Difficulties and Methods in Teaching Children who are Hard of Hearing." (Author's abstract.)

In the handling of the hard-of-hearing child, two elements must be considered, the *hygienic* and *educational* elements.

Let me first speak of the hygienic features, including local treatment.

Hardness of hearing has many different causes, some of which are removable. First, then, remove the causes, if you can, be they adenoids, hypertrophied tonsils or nasal tissues, catarrhal conditions, or what not. Such treatment, which is, of course, the physician's, will relieve some cases permanently.

But if we are dealing with chronic cases, a certain hygienic regimen becomes necessary. Nose and throat must be kept scrupulously clean, eventually by aseptic washes and gargles, and care must be taken that only pure, cold air be breathed freely day and night. Much exercise in the open air is very desirable. Mouth and teeth must be kept in as perfect condition as possible so as to avoid bacterial complications. Avoid colds and

inflammations, not so much by keeping the children warm as by inuring them to fresh air and cold baths. General cleanliness and a rational hardening process are important factors. There must be a general tonic regimen, improving the vitality of the system, and healthy reaction of all organs.

The matter of diet deserves much attention. Simple and natural as the life of these patients should be, as simple be their diet. Non-irritant food, easily digestible, albuminous substances in preference; good milk; no dish either too hot or too cold; avoidance of stimulants like coffee, tea, and liquors, such as would cause congestions—these are the main requirements, and well enough known to all of you. All this is a matter of rational home regimen.

They form the necessary basis for the educational efforts we may make for the alleviation of the pathological condition. Even in the *training* of the hard-of-hearing child, *physical* training, gymnastic exercises, stand in the foreground; again in the first place, on account of their effect upon the tonicity of the body, on the digestive functions, the circulation, the joyfulness of spirit. The play instinct must be made use of, and games and sports will contribute much to developing the child's condition. In these latter, we have principally large movements, bringing the larger muscle-groups into activity, and inciting to exhilarating exercise and to wholesome growth. The games also mediate, in play-form, a knowledge of the occupations and the elements of civilization, like hunting, riding, etc., and give experience in skill and concerted action. It would be wrong to subordinate this free play too much to formal exercise, as the body as a whole is first in need of stimulation. Sports and games also encourage a life in the open air.

But the value of formal gymnastics must not be underrated, especially of rhythmical and co-ordinated exercises. The influence of the normal condition of the hearing faculty upon movement, rhythmical movement, is marked, and any impairment of the aural faculty leaves its effect upon the motor activity. The hard-of-hearing child is uncertain, inco-ordinate, and unrhythmical in its movements, more so, it appears to me, than the child with defective vision, at least in a number of cases. Consequently, exercises that will train the child in rhythmical and co-ordinated movements, like free exercises, drill with dumb-bells and Indian clubs, swinging from rings, etc., will supply a want

in its general physical and psychical make-up. These exercises may at the beginning have to be of a passive character, until the child gets the rhythm into its motor-consciousness. We must not forget that the hard-of-hearing child is deprived, to quite an extent, of the stimulus and help *music* affords, and that this circumstance puts it at a great disadvantage in all its movements and incentives for movements. A whole chapter could be written about the importance the musical stimulus has for the healthy development of the normal child. In the hard-of-hearing child whom these stimuli rarely or imperfectly affect, entire areas of the brain may remain rudimentary. Permit me to refer only to the effect upon its *emotional* condition. The rhythmical feeling is closely connected with our emotions—with our sense of beauty, of grace, of harmony. The mere beating of a drum inspires not only savage tribes but civilized man to rhythmical sensations which set free emotions of courage, of patriotism, of joy, of pleasure, or of sadness and grief. In the soul of the hard-of-hearing child, there are vacua, or, at best, but scattered fragments of these perceptions and emotions; and it lacks, to a marked extent, harmony, grace, temper. It is apt to be morose, suspicious, irritable, changing to excessive, painful hilarity, without measure or control. The more, therefore, we can introduce the element of rhythm into the education of the hard-of-hearing child, the better for its psychical development.

Special exercises may have their value. I have in mind particularly those that will develop respiration. Lung and throat gymnastics are of great importance; they will enhance the faculty of speech, which is much impaired by the lack of hearing. Exercises on the convex ladder, with wands, general breathing exercises, blowing up of cheeks, etc., should be followed by well-graded exercises in articulation.

Gymnastic exercises also stimulate and train the power of *attention*, and of co-ordinate movement. How necessary a strengthening of the attentive faculty is for the hard-of-hearing child will be shown later. As to co-ordinated activity, gymnastic exercises find their natural complement in *manual training*, which may include gardening, carpentering, wood- and iron-work of different kinds, basket-making, weaving, sewing, modeling, painting, drawing, cardboard geometry, and a variety of occupations. Here, again, one must begin with the larger movements, and introduce the finer co-ordinations, with smaller work, gradually. The ele-

ments of civilization, which are symbolized in the games, assume a more real aspect in manual training; and this circumstance is very important, as the hard-of-hearing child is deprived of the opportunity of gathering that vast amount of information which the hearing child absorbs from the conversation with, and of, others. Any one who has had any dealings with hard-of-hearing children will be struck with their peculiar lack of general information. They are apt to confuse the simplest things and relations, because they lack the chance of correcting and organizing their impressions by speech intercourse. They remain, to a large extent, shut up within themselves.

It is for this reason, also, that their instruction will have to be largely objective and creative in method. The senses of sight, of touch, and the muscular sense must be developed to aid them in their intellectual growth. Pictures, toys, indoor games, will play a great part in their training. The other senses will have to do at least a part of the work which otherwise would be the function of the aural sense. But there is a deeper reason for so doing.

Senses mutually stimulate one another. There seems to be a special relation between the sense of hearing and that of the perception of color. Cases have been reported of color-hearing—that is to say, each sound heard, by certain persons at least, produces in them a distinct sensation of color. There is a case recently mentioned in the *British Medical Journal* of a neuropathic man of impaired mentality who had all consonants and vowels associated with color sensations. The cry of a dog was yellow, of a blackbird red, of a raven greenish, of a cow indigo, and of a goat light yellow. Sensations of form were associated with color and auditory sensations—thus, a circle always appeared red, and had the sound of the vowel *o*. Smells also had associated colors—thus, that of iodoform had a deep red color, also a sour, bitter taste. Impressions of taste had colors—thus, sweet was carmine, salt an agreeable yellow; and impressions of color had accompaniments of taste and temperature—cold was green, and heat was red.

Now, while a neuropathic condition may predispose a subject to morbid associations, it is, nevertheless, true that many normal persons have similar "inductive perceptions," as we may call them. And since hard-of-hearing children belong to a class where normal conditions are suspended or modified, further in-

vestigations may reveal how a stimulation of other senses will react upon the aural sense and there produce sensations which may, in a measure at least, re-institute normal function.

At any rate, complete perception requires the rounding out of a concept by the co-operation of several senses. For instance, the concept of a bell is composed of the perception of its sound, shape, hardness, etc. It is evident, then, that if one sense perception is eliminated from this composition, the complex concept is imperfect. The hard-of-hearing child may never have a full understanding of what a bell is; but if we succeed in making the other composing elements of the concept particularly strong, it may, by inference, arrive at a fair notion.

This inference plays a part in another relation, that of speech to hearing. The hard-of-hearing child will always have difficulties in speaking correctly. But this difficulty can be minimized by painstaking training of the organs of speech, through practical phonetics. When the muscular associations and activities which make speech will have come under the ready control of the hard-of-hearing child; when the association tracts in the brain centre of speech will run smoothly, there will also be a beneficial effect upon hearing. That is to say, even an indistinct sound-stimulus, of the spoken word, will set free in the brain centre those associations which correspond to the motor-memory-image of that word, and, through automatic imitation, the spoken word will be perceived more readily and clearly; just as a person of normal hearing will understand even indistinct speech, or as we can read a written page of familiar words even under insufficient illumination, not being able to see every letter or word, but composing the whole from the fragmentary visual stimuli we receive.

As Professor Donaldson shows (*Growth of the Brain*, p. 349): "Clinical studies furnish grounds for the idea that the presentation of an object to any one of the senses revives the mental image of that object in terms of the other senses which may be, and formerly have been, excited by it, and that the more vivid these associated images, the more concrete and clear is the conception." Since many hard-of-hearing children have acquired their impairment of function after birth, and as all have hearing in at least a rudimentary form, the application of this statement is evident. It furnishes the only explanation why Helen Keller, who now perceives only through her tactile and muscular

senses, can think in terms of the other senses, which, in her case, appear atrophied.

If we agree with Dr. Joseph Collins, who asserts the "monitorship of auditory over other images" (*The Faculty of Speech*, p. 51), and I think he is more than right, if we remember how sorely handicapped hard-of-hearing children are through their lack of speech-communication and speech-expression, how their information is fragmentary and their abstract thinking often ill-organized (Max Müller has said: "Language is identical with rational thought"), if we remember how many of these children remain on the low plane of "objective thinking"—we must welcome every opportunity of improving the hearing faculty by educational means, after the physician has stepped aside. Mechanical means are even at the present day poorly developed. The ordinary ear-tube has its dangers, being a source of mechanical or infectious injury.

The fact, by the way, that hard-of-hearing persons can hear better over the telephone, has led to experiments with an apparatus which is constructed on the same principle.

But neither this nor the device of lip-reading improves the hearing, or has any educational value.

In considering means in this direction, we must of course recognize the different classes of hard-of-hearing children: the *near*-hearing children, and the *weak*-hearing ones, and those in whose sound-perception there are modifications of values, comparable perhaps to color-blindness in the province of vision.

But the secret of success in every case will be in the training of the child's *effort* and *attention*. Concentrate attention upon aural impressions, so that these, faint in the beginning, may increase in force. It is astonishing what results can be obtained in strengthening the hearing faculty by judicious and systematic exercise, if the necessary opportunity, time, and patience be granted. For such work is very slow, and requires years, sometimes many years. I have reports from several successful teachers of hard-of-hearing children, notably Mrs. Reno Margulies, which show how children, considered to be even deaf, were able to learn how to hear. Daily tests with bells, tuning-forks, whistles, musical sounds, words spoken at different pitch, etc., lead up to more complicated exercises, always following the sequence of sounds as conditioned by their respective auditory

values. The best results are accomplished if the children can be taken very young.

It is evident that all this is very special work, to be done only by specially trained teachers. It is not the work of the schools for the deaf-and-dumb; these have their own special field. But there ought to be day-classes and day-schools; and for the many who need a well-regulated educational and hygienic environment, special institutions, where these children can be educated. There are many thousands of them, of different degrees of impairment. Few of them as yet receive the proper training—most are dragging along an awkward existence in ordinary schools where they cannot thrive, but are having their minds and faculties warped. This is only one part of the great problem of the "*atypical child*," which it has been my privilege to broach—that is, of the child which is not abnormal enough to be classed with the blind, or the deaf, or the idiots, or the feeble-minded; which is not necessarily dull at all, but may be even brighter in intellectual force than the "*average*" child; but which is handicapped by impairments of the nervous system, of the sense-organs, of the bodily functions, etc., in such a measure that it needs special attention and special training, and often a special environment. A beginning has been made to tackle the problem of the atypical child; may the work grow so that it may bring its blessings to the thousands who need it.

Dr. JARECKY said that, in thinking over the papers read by Dr. Toeplitz and Dr. Groszmann, it seemed to him that the principal point to be brought out was the absolute necessity of starting the educational work as early as possible—much earlier than the kindergarten age. A child that loses its hearing should be taught to repeat words and sentences. Words should be spoken over and over again, so that the child may retain whatever faculties it may possess at the time. The method of turning away and having the child sit with the ear towards the speaker, whose lips are covered, is somewhat successful. But whether these children hear better later on than they did before, he doubted very much; he considered that all that was gained was what Dr. Groszmann had brought out in his paper: concentration in the individual from beginning to end; that the principal thing was the individual training of these children.

Dr. PHILLIPS commended the two papers read, and spoke of an instance which occurred two or three years ago, when, in

talking with a blind woman she remarked that it had always been a cause for great thankfulness that she was blind rather than deaf. She gave as her reasons, that while blindness shuts out colors and views and the faces of friends, deafness shuts out far more. These statements had led him to think much more seriously of the effects of deafness. He emphasized the great importance of commencing the teaching of deaf children in very early life, provided the physical training should keep pace. As regards the hygienic training, Dr. Phillips said that the greatest care should be taken with reference to the physical development of every child, whether deaf or not. He did not believe that people could possibly comprehend what it means for a child to start out in the struggle for an education—and even for the very necessities of life—without the foundation of strong, vigorous health. Children should not be coddled, but trained so that they will be able to withstand the changes of temperature and the necessary exposure incident to the climate in which they live. The development of the other faculties as an aid to hearing had never been so fully impressed upon him before, and he believed there was a great deal to be accomplished along these lines. He also remarked: "There can be no time better spent by the man who is giving his time in ear clinics, than to stop for a moment or two and instruct mothers and fathers as to the necessity for commencing, under the best circumstances possible, the education of their deaf children at a very early age." He considered it useless to send a child with defective hearing to public school, but those who attended should be given front seats. He spoke of the great necessity for more and larger institutions for the education of the deaf. He said he believed that the time was coming when more would be done by the city governments for the education of these children—since so many of them become public wards when with education they might be self-supporting.

Dr. MEIERHOF said that he had had some personal experience in the matter; that the subject of teaching the deaf and the partially deaf had already received a great deal of attention in Europe. He said that in the education of the deaf the methods of Urbanschitsch have been followed more or less. He spoke of the importance of the management of the *partially* deaf, saying that as yet no provision had been made for the teaching of these, that the term "partially deaf" was a very elastic one, covering

many grades of deafness. He spoke of a class of children who make no progress in ordinary schools even though they have a fair amount of hearing—hearing for loud conversation. The doctor mentioned that there are quite a number of these children who to-day are in deaf-mute institutions although they do not belong there; that it was injurious to them, inasmuch as they had no opportunity to exercise the remaining function. He said that he believed some provision should be made by the State or the city for the teaching of such children whose parents cannot afford to pay for them. These partially deaf children degenerate and become a class belonging to the deaf-mutes, and it is certainly unfair that this state of affairs should continue to exist. Dr. Meierhof spoke of another feature—the mentality of the partially deaf. The so-called otosclerosis or hardening process that goes on in the labyrinth and the inner tympanic structures is seen in a certain class of older children in which the mental development may also be retarded. There should be some provision made for the partially deaf, and whether this body should initiate a movement whereby the city should provide means for the education of this class, was left for the consideration of the Section.

Dr. H. KNAPP spoke of psychical deafness, a defect analogical to psychical blindness, saying that both were mostly acquired, but may be congenital. He referred to children that cannot learn to read. Although they may be very intelligent in other studies, mathematics, for instance, they have the greatest difficulty to learn the alphabet. The cause was nothing but the insufficient development, or, in adults, the deterioration of the memory centre of sight, which occupies a definite area in the brain, being, you know, quite near the conceptional centre of hearing, which is situated in the posterior part of the two upper convolutions of the temporo-sphenoidal lobe. He said that these parts were the storehouse of the memory pictures as developed by experience and study. When they are degraded or destroyed, the psychical interpretation of the visual or auditory perception is weakened or impossible. For instance, a man loses his own language and keeps French, Latin, Greek, etc., which he did not know so well. Then, only one particular place of his memory centre is obliterated. A number of such cases among musicians, composers, etc., are on record, it being thought that Beethoven was one of them in his old age. Dr. Knapp spoke of a musician and composer

whose case had, over a year ago, been reported by Dr. F. Alt, of Vienna. This man, after a disease, could not appreciate music when played; all was an intolerable discordant noise; but when he looked over a score he was delighted; he had the same impression and sensation as if he heard it played by a perfect orchestra. There is a problem before us: to find out whether a person is deaf from morbid conditions of the receptive, conductive, and perceptive parts of the auditory organ, or of its conceptional part. Let us call the former—by far the greater number—the mechanically deaf, the latter the psychically deaf; or, shorter, the ear-deaf and the soul-deaf. When we analyze the case of a deaf child with regard to its education, we must separate these two kinds of deafness. In the ear-deaf we must examine all the parts concerned in the mechanism of hearing: auricle, ear canal, drumhead, drum and its contents, labyrinth, the nervous conduction to the centre of perception, *i. e.*, the auditive cortical field in the temporal lobe. In the soul-deaf we must examine the psychology of hearing, the memory or conceptional centre, and its connecting fibres with the motor centre of speech, and the aural connections between the right and left hemispheres. In this last part there is a larger field yet to cultivate, which is chiefly the business of the physician, especially the pathologist. Examine soul-deafness, which, like soul-blindness, may be congenital or acquired, and let the pathologist carefully dissect the brain, in particular the region below the end of the Sylvian fissure. The shortcomings in the mechanical part of hearing are tolerably well studied. In this group of cases the educator must take the aurist as a coadjutor, in the other the psychologist, according to the principle that his psychically hard-of-hearing pupil must supply his defects of audition by the other senses, which Prof. Groszmann has also pointed out. In this way the educator may bring up a human being mentally, as far evolved as his contemporaries, and acceptable to the society of civilized people.

Dr. TOEPLITZ said that, although he did not prove by figures his claim that many of the children in the public schools are hard of hearing, he was positive that this was the case. He instanced the examinations made in Germany, where quite a large percentage of pupils were found to be partially deaf. He remarked that Dr. McKernon, in examining a school in Yonkers recently, had found, among 150 pupils, 38 with hardness of hearing and 20 with bilateral deafness—that is, 33% unilateral and 13%

bilateral. He thought that if the schools in New York City were examined, a similar number with defective hearing would be found. He suggested that the authorities should not appoint at random, for the examination of children, men who have no proper idea regarding the examination of the eye, the ear, etc.; that only men with the requisite knowledge and intelligence should fill such places; that these children with defective hearing should at least be placed in separate classes.

Dr. GROSZMANN, in closing the discussion, said that he had little to add; that he had been very much interested in the discussion which had followed Dr. Toeplitz's paper and his own, and that he felt much indebted to Dr. Herman Knapp for bringing out the psychic side of the subject. As regarded color-hearing, the doctor said that he personally knew very little about it, except that he had had an opportunity of experience with quite a number of persons with whom color-hearing seemed to be a fact. He spoke of several schools in this city that pay special attention to children partially deaf, and thought that this work should not be left to private enterprise entirely, but that the city should take up the subject and care for this particular class of children, as regards their education. The doctor spoke of having examined children in the public schools; he said that the number suffering from adenoids and other obstructions was simply amazing. He told of a California investigator who claimed that the percentage of children who are handicapped—visual, aural, etc.—is as high as 25, leaving only 75 % of children who should be in the ordinary schools. The doctor thought this might be slightly exaggerated, but expressed his belief that there were thousands of children for whom special provision should be made—children whose circumstances would prevent their being sent to private institutions. He suggested, too, that the medical supervision and examination in the public schools should be better organized than it is at present; that a systematic examination of the children has not yet been instituted; that there should be specialists for this purpose, as brought out by Dr. Toeplitz.

REPORT ON THE PROGRESS IN OTOTOLOGY DURING THE SECOND QUARTER OF THE YEAR 1903.

BY DR. ARTHUR HARTMANN.

Translated by Dr. ARNOLD KNAPP.

ANATOMY AND PHYSIOLOGY.

125. **Alexander, G.** Post-embryonal growth of the human ear labyrinth. *Anatom. Hefte von Bonnet und Merkel*, Heft lxiii. (vol. xix., No. 3).
126. **Rabinowitch, A.** The development of the membranous labyrinth in the *Emys Europaea*. *Inaug. Dissert.*, Berlin, 1903.
127. **Rawitz, Bernhard.** The semicircular canals of the turning doves. *Arch. f. Anat. u. Phys.*, 1903, Nos. 1-2.
128. **Hanson, E.** A case of the internal carotid passing through the tympanum. *Münch. med. Wochenschr.*, 1903, No. 22.
129. **Levi and Rothschild.** Congenital facial paralysis with mal-development of the ear. *Arch. internat. d'otol.*, etc., 1903, p. 373.
130. **Panse.** A simple method to prepare the temporal bone for microscopic examination. *A. f. O.*, vol. lviii., p. 129.
131. **Ferreri.** Hearing after operative intervention on the sound-conducting apparatus. *Arch. ital. di otologia*, vol. xiv., No. 2.
132. **Wassiljew.** The fatigue of the auditory nerves. *Wojenno Medicsinski Shurnal*, March, 1903.

125. The author has made enlarged corrosion specimens of the inner ear of the new-born and adults. After-measurements agree with those of Siebenmann, whose careful paper the author has apparently overlooked. The measurements of the aqueducts of the internal auditory meatus and of the nervous canals are new, as well as the relations of the position of the various parts of the labyrinth to one another. **DENKER.**

126. A series of embryos of land turtles were examined in serial sections, and six of these were reconstructed according to

Born's method. This is the first monograph on the embryology of the ear labyrinth of the land turtle. **BRÜHL.**

127. RAWITZ observed two turning doves which performed somersaults when they were sitting on the ground and were forced to get up. The anatomical examination consisted of serials of a macerated and a hardened skull. On both sides, perfectly normal semicircular canals were found present. A section of the horizontal canal is said to cause the somersault movements. The author concludes that the canals have nothing to do with the function of equilibrium, inasmuch as these turning doves, notwithstanding these disturbances in equilibrium, possess normal semicircular canals. These positive findings of anomalies of the semicircular canals in dancing mice do not contradict the normal condition found in the turning doves, as the latter possess disturbances of equilibrium, while the dancing mice show a disturbance in orientation. **BRÜHL.**

128. The artery rose from the floor of the tympanum, covering the round window up to the upper margin of the oval window, then described a curve on the promontory anteriorly and inwardly, passing underneath the musculo-tubal canal, and finally entering the bony carotid canal in its horizontal part. The space between the promontory and the membrana tympani was completely filled by the carotid; the drum appeared somewhat bulging. **SCHEIBE.**

129. A delicate child, three months of age, presenting an undeveloped left auricle, which is forced forward, together with the cartilaginous auditory meatus, and attached to the cheek. Peripheric facial paralysis has existed since birth. A disturbance in development probably is also present in the middle ear. The mastoid processes on both sides are equally developed. The left half of the lower jaw is slightly atrophied. The ascending ramus of the lower jaw does not run in the same direction as the right, but more posteriorly and externally. The left parieto-occipital suture is not ossified. **OPPIKOFER.**

130. PANSE saws in five different planes, and the resulting dice-shaped pieces of bone contain all the important parts, even the ossicles, in their natural position. **HAENEL.**

131. After a critical study of the theories of Scarpa, Secchi, and Nuvoli on the physiology of the middle ear, the author describes his experiments, and concludes as follows:

(1) The favorable clinical results following intratympanic surgery can only be explained by the Helmholtz theory.

(2) The mobilization of the stapes is not without use.

(3) Secchi's theory, that the round window is the only way for the sound to be transmitted to the labyrinth, has not been proved.

RIMINI.

132. The examinations were practised with various tuning-forks on soldiers with healthy ears. In each soldier the air- and bone-conduction were examined. Irritation of the auditory nerve, with all the tones, was followed by exhaustion in air- and bone-conduction more quickly than the irritation with deep forks. In bone-conduction the fatigue appeared more quickly than in air-conduction. These results led the author to conclude that the sound-waves in bone-conduction act directly upon Corti's organ without passing through the tympanic cavity. If the sound-waves in bone-conduction would at first pass through the tympanic cavity, they would be diminished in their action; and this would not explain the more rapid fatigue of the nerve cells in bone-conduction.

SACHER.

GENERAL.

a.—REPORTS AND GENERAL COMMUNICATIONS.

134. Grunert and Schulze. Annual report of the university ear clinic in Halle, from April 1, 1902, to March 31, 1903. *A. f. O.*, vol. lvii., p. 231.

135. König. The examination of the ears in a village school. *Bresgen-Heermann'schen Sammlung zwangloser Abhandlungen*; Halle, Marhold, 1903.

136. Laubi. Methods and results of an aural examination of 22,894 pupils in the public schools of Zurich. *Correspondensblatt f. Schweizer Aerzte*, xxxiii., No. 13.

137. Bezold. Demonstration of four operative cases: two tumors, a plaster cast in the auditory meatus and a cholesteatoma with gravitation of pus to the scapula and clavicle. *Vortrag im arztl. Ver. München. Münchener med. Wochenschr.*, 1903, No. 22.

138. Felix. The unconsciously deaf. *La semaine médicale*, 1903, p. 101.

134. The following are the important case histories and autopsy reports during the year:

(1) Interlamellar abscess of the drum membrane.

(2) Chronic purulent otitis with pyæmia. Radical operation after slight remitting fever for ten days; chill; temperature 39°. The distended tip of the mastoid process was removed. High

fever, without a chill, with unusually rapid pulse. Operation on the sinus after ligation of the jugular vein. Gradual fall of temperature, which, however, continued for four weeks after the sinus operation.

This case illustrates the opinion held in the clinic in Halle—not to operate on every case of sinus thrombosis, but wait after the removal of the primary focus in the mastoid process when the general condition is good and only moderate fever is present. This is supposed to mean a but mildly virulent thrombus. If then the fever rises, chills or other signs of severe systemic infection of the body appear, then the sinus is to be directly attacked.

(3) A case with doubtfully diagnosed ear pyæmia following a bilateral acute otitis media, or a severe pyæmic form of the protracted form of scarlatina without exanthem was present. Recovery without operation except the surgical treatment of the metastases.

(4) Chronic purulent otitis with cholesteatoma. After the radical operation, at first normal course; seven weeks later a fistula was discovered in the horizontal canal, which discharged pulsating pus. Labyrinth operation: the vestibulum was chiselled open from the posterior branch of the horizontal semicircular canal, as well as the cochlea from the promontory. After removal of the oval window, a small bridge of bone of the exposed facial canal alone remained. During the after-treatment, which lasted five months, a sequestrum consisting of the cochlea was cast off. The at first total facial paralysis later decreased. Unusual in this case is the complete absence of vertigo, which is, however, explained by the findings at operation. Suppuration of the labyrinth: the functional examination before the labyrinth operation showed no hearing for whisper and high tones near the diseased ear; C was transferred from the vertex to the other ear.

(5) Bilateral cholesteatoma. On the right side an operation had been performed by a surgeon four years ago. There now exist an atresia of the meatus, total facial paralysis, deafness, and vertigo, which are said to have existed for many weeks. The labyrinth was unquestionably injured. After radical operation, with an extensive exposure of the facial nerve, the suppuration was healed and the facial paralysis disappeared.

(6) A chronic middle-ear suppuration, with suspicion of intra-

cranial complication. Lumbar puncture was negative, so purulent meningitis could be excluded, and tuberculous meningitis was made probable. At the radical operation the dura of the middle cranial fossa was found diseased and an abscess in the temporal lobe was suspected. An incision was made into the temporal lobe, but no abscess found. The varying character of the disease in its future course corroborated the suspicion of the tuberculous meningitis. The case remained unexplained; by the wish of the parents the patient was allowed to go home.

Of the fatal cases, the following are remarkable: (1) Abscess of the temporal lobe after acute otitis media. Notwithstanding operative evacuation of the abscess, progressive softening in the neighborhood of the abscess to near the ventricle. Sympathetic exudate into the ventricle, then cerebral hernia, a rupture of the ventricular exudate into the abscess cavity on the eleventh day after the operation. Infection of the ventricle and development of meningitis, which terminated fatally after eight days. The authors think that the intracranial complication developed as a result of retention of pus, which was aided by irrational insufflation of boric acid powder. (2) Cholesteatoma. Perforation of abscess of the temporal lobe—characterized by a tense and retarded pulse—into the lateral ventricle; fatal meningitis which ran its course with chills, though the sinuses at autopsy were found normal. (3) In a case of cholesteatoma, chills and high fever were suspicious of a sinus thrombosis. In the absence of external symptoms the perisinuous abscess was simply evacuated. Then the course at first was free from fever, and did not suggest the necessity of a sinus operation—although several symptoms were suspicious of septico-pyæmia: chills, sweating, and jaundice. Eight days later, after repeated rises of temperature, tenderness and glandular swelling along the sterno-mastoid, œdema extending from the posterior margin of the wound to the occiput, the sinus, after previous ligation of the jugular vein, was opened. The sinus thrombosis was found on its way to recovery. A non-diagnosticated brain abscess caused a fatal meningitis by perforating into the lateral ventricle. The brain abscess had been suspected, but in a different location. It was found to be situated in a very unfavorable position in the occipital lobe. As the symptoms of the brain abscess did not

become clear until after the sinus operation, it was thought, in the absence of urgent symptoms, best to wait for the healing of the pyæmia, and thus obtain better chances for the operation of the brain abscess. (4) Purulent meningitis, infection through the labyrinth, in a case of chronic middle-ear suppuration. Meningitis proved by lumbar puncture. Notwithstanding high temperature, the retarded and tense pulse was suspicious of a complicating brain abscess. This, however, was found absent at the autopsy. Unusual is the absence of rigidity of the neck, notwithstanding a thick exudate on the cerebellum and at the medulla oblongata, as well as the absence of pathological changes in the eye grounds. Glycosuria of the last days is explained by the ventricle meningitis. (5) Tuberculous otitis media, tuberculous meningitis, both symptoms of general miliary tuberculosis originating in the tuberculosis of the lungs and bronchial lymph nodes. An extension of the tuberculous process from the ear to the cranial cavity was not found. (6) Acute middle-ear suppuration. Suspicion of tuberculous meningitis. Autopsy showed that meningitis symptoms were due to a simultaneous pneumonia which had caused a hyperæmia of the meninges and cerebral oedema. (7) Subacute purulent otitis without tuberculous signs. Death from miliary tuberculosis, independent of the aural lesion.

In conclusion, a tabular review of 125 mastoid operations performed in the clinic is added. The authors draw attention to four cases of chronic purulent otitis which healed with closure of the drum a quarter of a year after the simple mastoid operation according to Schwarze. They considered that in all those cases of chronic purulent otitis with mastoid involvement, which are not complicated with cholesteatoma and present no perforation in the superior and in the supra-posterior quadrant, the Schwarze operation is sufficient.

HAENEL.

135. KÖNIG examined 787 children for changes in the ear, nose, and throat, and examined the hearing with the acoumeter, voice, and tuning-forks:

289 had normal hearing on both sides.

66 had one deaf ear.

432 were deaf in both ears; of these, 135 had only a hearing power of $\frac{1}{3}$, or less.

In only 12, that is $2\frac{1}{2}\%$ of the bilaterally deaf, was the deafness noted.

In 80 cases there were signs of existing or old suppuration, chiefly caused by scarlet fever. Four children were operated upon—two suffered from nervous deafness, 1 from bilateral and 1 from one-sided deafness with stapes-ankylosis.

105 suffered from enlargement of the pharyngeal tonsil; of these, only 15 were able to hear normally. 143 suffered from enlarged faucial tonsil. Interference with nasal respiration was found present in 36 children suffering from chronic rhinitis. Chronic granular pharyngitis occurred in 195.

Most of the children with hearing under $\frac{1}{2}$ had to tell the teacher that they did not always hear distinctly, and consequently were not able to follow the instruction. Of the 404 boys, 60 were even at this time unsuited for military service on account of deafness. Very often, in about 50 % of the cases, the parents of the deaf children suffered also from poor hearing. The appalling amount of ear disease in the country population would make it desirable to have better government inspection.

HOLSCHER.

136. LAUBI examined 22,894 pupils after the methods of Bezold. The results were collected in three tables. The first showed a survey of the entire material; the second, the frequency of the various diseases and the sum-total of various anomalies; the third showed the degree of deafness found in the various diseases. 10 % of the pupils were abnormal as regards their hearing; of these, 27 % were able to hear a whisper in .2m, 23 % in from 2-4m, 49 % in from 4-10m. The practical conclusions derived from this examination do not differ from the well-known opinions on this subject.

BRUEHL.

137. (1) An angio-sarcoma as large as a hen's egg, which was badly situated within a palate in the direct surroundings of the concha; healed after extirpation.

(2) An adeno-carcinoma of the external auditory canal, as large as a pigeon's egg, starting from the sebaceous glands; also healed by operation.

In both cases the facial nerve was exposed and hearing was still present.

(3) A plaster cast in the auditory meatus removed by retraction of the auricle, irrigation of the membranous canal, and dilation of the bony meatus.

(4) Chronic middle-ear suppuration with cholesteatoma and extensive gravitation of pus, which did not proceed downwards

through the incisure, but along the sinus, the bulb, and the jugular vein. Operation. Recovery.

SCHEIBE.

138. FELIX examined the ears of 1050 adults under fifty years, belonging to the poorer classes, who were attending the dispensaries for various internal troubles. 290 were deaf; of these, only 22 complained of loss of hearing. 1038 school children were examined; of these, 327 were found deaf; in only 12 of these had the deafness been noted by the teachers.

OPPIKOFER.

b.—GENERAL PATHOLOGY AND SYMPTOMATOLOGY.

139. Bernhardt. The injuries of the organ of hearing, especially in regard to the nervous system. Forensic monograph. *Vierteljahrsschr. f. ges. Med.*, vol. xxv., and also separately, Hirschwald (Berlin).

140. Patel. Remarks on certain forms of isolated fractures of the petrous bone. *Revue de chirurgie*, 403, p. 483.

141. Pfimmlin. On the functional disturbances of the organ of hearing in advanced age. *Inaug. Diss.*, 1903.

142. Kosteljanetz. The relation of diseases of the ear to those of the nose and of the naso-pharynx. *St. Petersb. med. Wochenschr.*, Nos. 13 and 14, 1903.

143. Stirling. The question of nasal treatment for the cure of diseases of the ear. *Laryngoscope*, April, 1903.

144. Wingrave. Tobacco deafness. *Journ. of Laryng.*, April, 1903.

145. Mancioli. A case of periodic deafness. *Arch. ital. di otol.*, vol. xiv., No. 2.

146. Würtzen. Pathological changes of musical hearing, and musical perception and expression. *Bibliothek f. Lager.*, vol. iv., p. 155, 1903.

139. This paper is in two parts. In the first, various ways by which death results after an injury to the ear; in the second, the various injuries of the auditory organ are discussed separately. These are in turn divided into those of the sound-conducting and sound-transferring apparatus. The diagnosis of the injuries to the internal ear is treated from a medico-legal standpoint. The traumatic diseases of the ear, of a neurasthenic and hysterical character, are also described. The monograph has also appeared in book form. It is written in a lucid style, and the literature is not overlooked. It will serve as a very welcome source of information to many.

BRUEHL.

140. Though most fractures of the petrous pyramid result indirectly from blows on the exterior of the skull, direct fractures are possible. The author has produced a direct fracture experimentally, and shows that the direction of the fissure depends upon the line of the acting force.

OPPIKOFER.

141. The author has examined 140 persons over sixty years of age in the Freiburg ear clinic. He finds the most frequent disease of the ear in advanced age is nervous deafness, or an affection of the labyrinth. The perception for the high tones suffers the most; bone-conduction is considerably reduced. The presbyacoustic law of Zwaardemaker holds good for sixty years or more. A part of the cases of deafness may be regarded as increase of the physiologic presbyacusis. A relatively frequent cause of deafness in advanced age is fixation of the stapes.

BRUEHL.

142. Of 1000 ear patients, 671 presented no change in the naso-pharynx. Changes in the nose and naso-pharynx were present in cases of otitis, in 107 (acute 34, chronic 53, residuum, 20); in tubal catarrh, in 161 cases (acute 41, chronic 120); in sclerosis and adhesive processes, in 46 cases; in deafness following intoxication, in 4; in affections of the labyrinth, in 11; collectively, 32.9 %. From this etiological result, the importance of nasopharyngeal disease is recognized in therapeutics. SACHER.

143. Diseases of the ear benefited by nasal treatment are, or have been, Eustachian-tube cases. Such treatment is unprofitable to the patient in cases of pure sclerosis, and in aural catarrh it should be limited to removal of conditions which may be interfering with the recovery of the mucous membrane lying between the nose and the tympanum. The rule followed by the writer is: a nasal operation for the sake of the ear should be one which is advisable for the sake of the nose. CLEMENS.

144. WINGRAVE classified deafness due to tobacco smoking under three heads, according to their etiology:

(1) Mechanical or pneumatic, having its origin in the habit of smoking tightly packed pipes, etc., causing a violent or negative naso-pharyngeal pressure.

(2) Irritative or catarrhal.

(3) Toxic.

Seventeen cases were related.

ARTHUR CHEATLE

145. In a farmer twenty-two years of age, the hearing periodically got worse during the winter, to return again at the onset of spring. According to the author, this periodic deafness was due to vasomotor disturbance in the Eustachian tube, under the influence of peripheric irritations, namely, a change of temperature, and to the atmospheric pressure. RIMINI.

146. The author describes the various forms of diplacusis and amusia, citing typical case-histories from the literature. He adds the following four cases; personal observations:

(1) A lady suffered from an apoplexy, with right-sided paresis; she improved; after some aphasia she endeavored to play the piano; memory for tones and touch for the left hand were perfect; but touch had become lost for the right, while she was perfectly able to write. Later, the ability to play with the right hand returned. The ability to read notes, however, was lost, and there was a simultaneous hemianopsia.

(2) A young physician, otherwise normal, has been unmusical since earliest childhood. Music is a noise to him; he cannot perceive whether the musical selection is sad or light; he cannot remember any melodies; he cannot sing or in any way reproduce a melody; has very little sense of rhythm, and can scarcely dance.

(3) A woman somewhat neuropathic, otherwise healthy, has, since childhood, had no appreciation for music, which she regards as a more or less unpleasant sound; she cannot distinguish between light and heavy music; she cannot reproduce any tones, only inarticulate sounds, and does not remember a single melody; the rhythmic sense is scarcely developed, and she is a very poor dancer.

(4) A ballet dancer suffered from apoplexy, with left-sided hemiplegia; no aphasia, later, partial amusia. The musical memory is not reliable; hearing for purity of sound defective; he cannot sing; he has lost the rhythmic sense entirely. He can read music; but on attempting to play the violin the left hand cannot find the tones, and he does not realize the mistake. On the other hand, he still preserves great delight in hearing music.

The author, on the basis of Lichtheim-Knoblauch's table, describes four groups of musical disturbance depending upon the place where the interference in the sound transmission takes place.

JOERGEN MOELLER.

c.—METHODS OF EXAMINATION AND TREATMENT.

147. **Ostmann.** *a.* The influence exerted on Rinne's test by disturbance of sound conduction in the other ear. *A. f. O.*, vol. Ivii., p. 193.

b. The position of the absolute threshold value for bone- and air-conduction in normal hearers, and its relation to the time intervals found in Rinne's test. *A. f. O.*, vol. Iviii., p. 82.

148. **Lucae.** On the diagnostic value of tone examinations, with especial regard to the continuous-tone series of Bezold and my own method of examination. *A. f. O.*, vol. Ivii., p. 205.

149. **Bergemann.** Ear speculum with attached magnifier. *Deutsche med. Wochenschr.*, 1903, No. 21.

150. **Lucae.** An apparatus to apply the air douche in ear patients. *Deutsche med. Wochenschr.*, 1903, No. 21.

151. **Ballance.** Remarks on the operative treatment of chronic facial palsy of peripheral origin. *British Med. Journal*, May 2, 1903.

152. **Beck.** Superheated medicated air in diseases of the ear and nose. *Laryngoscope*, May, 1903.

153. **Barclay.** How to cure, by a novel method, hopeless cases of deafness and discharge from the ear. *Medical Fortnightly* (St. Louis), March 25, 1903.

147. a. OSTMANN has examined 32 soldiers with normal hearing by Weber's test, to determine the auditory conduction of one ear for c (*i. e.*, the length of perception by air-conduction in maximal vibration of the tuning-fork); and Rinne's test on the same ear while the other was kept open, also when firmly closed. This examination gave the following results:

(1) In Weber's test, after closure of the second ear, the tone, which was previously not lateralized in most cases, could be perceived in the occluded ear.

(2) The normal hearing and the result of Rinne's test varied greatly even in those with normal hearing, and the various degrees of Rinne's test were dependent upon the size of the hearing power.

(3) On closure of the other ear, Rinne's test was influenced so that bone-conduction was prolonged, and the positive value for air-conduction was diminished.

For the practical use of Rinne's test, these observations, in the author's mind, give the following conclusions:

I. Rinne's test is influenced—namely, that the hearing power for bone-conduction is prolonged; and air-conduction appears to be smaller than corresponds to the actual sound conditions of the examined ear, under the following conditions:

(1) In one-sided labyrinthine disease through the other ear, if the latter is normal, or deaf from a sound-conducting disturbance.

(2) In bilateral disturbance of sound conduction on the less affected side, by the more affected ear.

(3) In bilateral labyrinthine disease on the more affected side, through the less diseased ear.

II. (1) Rinne's test is not influenced in one-sided disturbance of sound conduction through the normal other ear.

(2) Bilateral disturbance of sound conduction on the more diseased ear, through the less affected ear.

(3) In bilateral disease of the labyrinth in the less affected ear, through the more affected ear.

b. Ostmann has found, after examining 52 normal ears, that in Rinne's test the total length of perception of the tuning-fork, by air-conduction, is shortened by 9 seconds after placing it on the mastoid process. He recommends a separate test of tone and of air-conduction, if their conditions are to be compared.

HAENEL.

148. LUCAE criticises the method of examining with the Bezold continuous series; he does not find the term "continuous-tone series" is correct, as the tones are separated by an interval of a half tone. Further, he does not consider the choice of instruments to be quite right; the armed tuning-forks have impure tones, and usually have an octave over-tone. Of the armed Edelmann's forks, which Bezold himself uses on account of their freedom from over-tones, Lucae did not examine any of the low forks, and of the others, only the tones c³ and c⁴, and in these he was not able to prove any over-tones. As the pitch in the Bezold tone series is the least in the deep tones, and the greatest in the high tones, Lucae recommends for the tone examination the opposite conditions, viz., that tone c³ and c⁴ should be produced by tuning-forks, while the deep tones should be produced by pipes or tuning-forks augmented by resonators. In testing with the deepest tuning-forks, Lucae thinks that the function of hearing may be confused with a tactile impression. Lucae recommends that the tone examination be simplified, and that the same should be restricted to musical tones. He describes fully the method which he has practised for years, and gives its worth by citing a number of examples from his practice. HAENEL.

149. Without knowing of the attempts of previous authors, BERGEMANN has constructed an aural speculum. It is connected at its wide end with a cylinder, which receives another cylinder containing at its inner end an exchangeable lens. The distinctness of the enlarged image thus obtained is praised.

NOLTENIUS.

150. LUCAE reports upon experiments which he has made with filtered compressed air, and finds that the various compressed-air apparatuses supply all necessary purposes for an air douche in aural practice. The unpleasant irritations following the careless use of carbonic acid are not present. NOLTENIUS.

151. This is a highly important paper. The history of the joining of the facial nerve to the spinal accessory and hypoglossal nerves is given. Seven cases are related at length with the modes of operation. The conclusions of the authors are:

1. Peripheral facial palsy is remediable by facio-accessory anastomosis, but the extent of recovery appears to be limited to associated movements in conjunction with the shoulder. In most cases the previous deformity disappears when the face is at rest.

2. For reasons above stated we would in future recommend facio-hypoglossal anastomosis rather than facio-accessory.

3. The cases suitable for operation are those in which the paralysis has lasted so long that no recovery is to be expected, say, facial palsy lasting six months without any signs of recovery. In our opinion, the sooner the operation is done after this date the better.

4. A suppurative causal condition producing an infective neuritis renders the prognosis after operative treatment less favorable than in cases due to trauma.

ARTHUR CHEATLE.

152. The volatile medicinal substances found by BECK to give the best results in this form of treatment in ear diseases are formalin, menthol, and chloroform. In chronic hypertrophic otitis and in chronic suppurative otitis, the formalin hot vapor succeeded in curing many cases where other usual means failed. The treatment is applied through a specially constructed apparatus, the temperature ranging from 150° to 200° F. The duration of the treatment varies from three to five minutes. The hot medicated air has also been successfully applied in acute otitis media, acute salpingitis, and furuncular inflammations of the auditory canal.

CLEMENS.

153. BARCLAY considers that ossiculectomy is a universal panacea for all pathological changes found in the middle ear resulting from suppuration or catarrhal inflammation.

CLEMENS.

d.—DEAFMUTISM.

154. **Lannois and Chavanne.** Results of examination of sixty-five deaf-mutes. *Ann. des mal. de l'oreille, du lar., etc.*, 1903, No. 1.

155. **Waldenburg.** The isocephalic blond racial element among certain deaf-mutes. Berlin, Calvary and Co., 1902.

156. **Forchhammer.** On the importance of definite methods in the instruction of deaf-mutes. *Habilitationschrift*, Kopenhagen, 1903. J. Friis-mod's Verlag.

154. The authors have investigated with tuning-forks and the voice, and have arranged their results in a table. They emphasize the fact in the examination with the tuning-forks that the examination with direct bone-conduction was often of value. They find, agreeing with Hartmann, complete deafness in 62 %, and some hearing remnants in 14 %. They have also looked out for the formation of the skull and the teeth, without having come to any important conclusion; unusually frequent, however, the upper incisor teeth projected, which they think is due to the fact that in the speaking exercises in deaf-mute schools the tongue is forcibly pressed against the incisor teeth.

ZIMMERMANN.

155. The author is of the opinion that marriages among relatives is not necessarily a cause of deafmutism, but of abnormal cerebral development. He thinks that, in order to describe the true causes, anthropological and prehistoric investigations should be pursued. He found among Jewish deaf-mutes very many isocephalic and hyperbrachycephalic heads; while in others, with normal development, the usual form of brachycephalia was present. Families which are free from deafmutism have few extreme brachycephalic and more mesocephalic and slightly dolichcephalic heads.

HOELSCHER.

156. The author discusses the various means of communication between deaf-mutes, and thinks that the means of communication should, as much as possible, correspond to true speech. The peculiarities of the speech of deaf-mutes and the instruction in articulation is first discussed. In this part, mention is made of the phonoscope. With the aid of this apparatus, it is comparatively easy to give the deaf an idea of the pitch of their voice. Then the various means of communication are described, which can serve in teaching by the use of speech. In simple lip reading many mistakes are possible. Therefore, in cases of subjects which are more or less unknown to the pupil, it is better to use other means. First of all, there is a form of writing which reproduces true speech and does not differ from the phonetic writing as much as the usual. Then the mouth-hand method, where the various movements of the hand are used to aid lip

reading. These two accessory methods have been of great help in the Nyborger Deaf-Mute Institute.

The book, in brief, is unusually well worth reading, and shows an unusual appreciation for the mental life of the pupils, as well as for the children in general.

JOERGEN MOELLER.

THE EXTERNAL EAR.

157. Hellatt. A case of obliteration of both auditory canals by osteomata. Operative removal. *St. Petersburger medicin. Wochenschrift*, 1903, No. 23.

158. Compained. Fibroma of the auricle and of the auditory canal. *Le Progrès médical*, 1903, p. 237.

159. Grunert. The etiology of primary interlamellar abscesses of the drum membrane. *A. f. O.*, vol. lvii., p. 200.

157. The patient, thirty-four years of age, presented a complete occlusion of both auditory canals by bony tumors. These were multiple, and appeared to rise from the anterior and posterior walls. As they adjoin each other closely, it is difficult to exactly localize them. Hearing: whisper, on both sides, 1½ metres. At operation the usual incision was made, and the cartilaginous and membranous canals were retracted. Both auditory meati were completely obliterated. A new opening had to be made into the bone, which proved to be very difficult, especially in the attempt to preserve the proper lines of direction. Also, the depth was difficult to estimate. On the left side, recovery was uneventful, the hearing returned to normal; on the right, after a short suppuration, owing to the opening of the drum cavity, the drum closed, but the hearing power did not improve.

SACHER.

158. The tumor, as large as a pigeon's egg, closed the left canal and was attached with a broad pedicle to the auricle. It was removed in local anaesthesia. Microscopically it proved to be a fibroma.

OPPIKOFER.

159. GRUNERT reports a case in which the patient had made a number of attempts to remove cerumen from his ear. Oil drops had been repeatedly instilled in the ear. The tympanic cavity was free from inflammatory symptoms. In the abscess numerous streptococci were found.

HAENEL.

THE MIDDLE EAR.

a.—ACUTE OTITIS.

160. Toeroek. Paralysis of the sixth nerve during a course of acute otitis media. *A. f. O.*, vol. lvii., p. 188.

161. McCaw. The treatment of acute mastoiditis and its influence on audition. *Laryngoscope*, April, 1903.
162. Heermann. Acute necrosis of the mastoid process and of the petrous bone, after scarlet fever. *Münch. med. Wochenschr.*, 1903, No. 22.
163. Blau. Retropharyngeal abscess after acute otitis media. *Deutsche med. Wochenschr.*, 1903, No. 14.
164. De Stella. A study of the aberrant mastoid cells. *La Presse oto-laryngologique Belge*, 1903, No. 2.

160. In the case of an acute purulent otitis, which was associated for some time with inflammatory symptoms in the mastoid process and with labyrinthine symptoms, a paralysis of the sixth nerve on the same side appeared. As the paralysis disappeared with the healing of the aural suppuration, the connection between the two affections seems probable. According to the author, the inflammatory process extended to the apex of the petrous bone, either along the pars petrosa or along the carotid canal.

HAENEL.

161. McCaw has failed to find any reference in the literature to the influence of acute mastoiditis on audition. According to the statistics presented in this paper, those cases operated upon during the first week of the disease show 72½ per cent. of recoveries with normal hearing (18 cases: 13 with normal hearing, 5 with little improvement of hearing). Of those operated upon in the second week, 60 per cent. recovered with normal hearing, 13½ per cent. with severe deafness (15 cases: 9 with normal hearing, 4 with slight, and 2 with intense deafness). During the third week 16½ per cent. recovered with normal hearing, 50 per cent. with severe deafness (6 cases: 1 case with normal hearing, 1 with slight, 3 with severe deafness) and 1 death from meningitis. The percentage of severe deafness and the diminishing percentage of recoveries to normal hearing, as the duration of disease increases, are considered a very strong argument in favor of early operative measures in all cases of acute suppurative tympano-mastoiditis.

The conclusions offered are the following:

1. Great reliance can be placed on abortive measures in the hemorrhagic variety of acute tympano-mastoiditis following influenza with a reasonably certain prognosis of normal hearing. In no other form of the disease can this be done.
2. The period of the disease at which appropriate treatment is applied influences the ultimate functional result.
3. In all cases requiring operation, the earlier we attack them surgically the greater will be the amount of hearing recovered.

4. The dry method of post-operative treatment seems to influence the function of audition, but to a less extent than early surgical interference.

	Number.	Cut Short.	Without Operation.	With Operation.
Ad. 1.				
Influenza { a. hemorrhagic...	10	10	10	0
b. purulent.....	31	20	0	31
Acute coryza.....	4	4	2	2
Measles.....	4	4	1	3
Scarlet Fever.....	3	0	0	3
Ad. 4.				
Dry method.....	27	17	7	1
Syringing.....	12	6	1	44

CLEMENS.

162. HEERMANN reports on thirteen cases of necrosis in acute purulent otitis after scarlet fever. This apparently large number of cases is due to the fact that in Holstein unusually severe epidemics of scarlet fever are not uncommon. The soft parts over the mastoid process were but little involved; the drum membrane rapidly disintegrated; there was some rise of temperature. The bone necrosis had, in one case, appeared on the second day of the disease. In the three cases which were examined bacteriologically, streptococci and staphylococci were found present. In one autopsy the tegmen tympani was found perforated and the bone gray and black to a large extent underneath the intact dura. The author favors early operation. He assumes that similar necrosis may occur after other acute infectious diseases. The reviewer, however, would like to state that necrosis in acute purulent otitis is not so uncommon as the author appears to think; in literature there are a number of reports of cases occurring in scarlet fever, measles, and diabetes, and a histologically examined case has been reported by the reviewer; and three years ago, at the meeting of the German Otological Society, the reviewer read a paper on the "Etiology of Necrosis in the Course of Acute Purulent Otitis."

SCHEIBE.

163. A child one year old, on the fifth day of a left-sided facial otitis, suffered from a pharyngeal abscess on the same side. It was in connection with the middle-ear process; on pressure being exerted on the abscess, profuse discharge appeared from the ear. The abscess was incised and evacuated, and was healed in eight days. The author believes that the pus travelled from

the middle ear to the retropharyngeal tissue along the canal for the tensor tympani muscle.

NOLTENIUS.

164. Reports on two cases of inflammation of aberrant mastoid cells. In the first, the inflammation had affected a cell situated posterior to the mastoid process, without causing any special symptoms. At operation, the antrum was found normal, though infection of the meninges led to death. In the second case, the aberrant cell was separated from the antrum by a bony partition $1\frac{1}{2}$ cm thick. It was situated behind and above the sinus, and it produced an extradural abscess. In this case the site of the cell was designated as a "tender spot" by the patient, and this led to an opening at operation. The symptom of these aberrant cells is an exactly localized pain, which is a valuable though an inconstant symptom. The local swelling, which is often distinct, will differ from the general swelling of the mastoid process. The aberrant mastoid cells are situated posterior in the antrum of the sinus and cerebral abscess. Anatomically, they have been found present by De Soutre in more than one-half of the cases. This author found them to communicate in the majority of cases with the antrum. DE STELLA, when aberrant cells are not suspected, only exposes the antrum and the diseased cells. If the fever does not cease, then the entire mastoid process is searched for these remote cells.

BRANDT.

b.—CHRONIC PURULENT OTITIS.

165. **Gray.** A new method of treating suppurating catarrh of the middle ear. *Lancet*, April 18, 1903.

166. **Reik.** The prognosis of chronic otorrhoea. *Maryland Medical Journal*, April, 1903.

167. **Ballance.** A fragmentary contribution to the operative treatment of chronic suppuration within the temporal bone. *Lancet*, April 11, 1903.

168. **Kohlmeyer.** On the etiology of aural polypi. *Dissertation*, Breslau, 1902.

169. **Nolte.** The methods of radical operation in chronic purulent otitis. *Inaug. Diss.*, 1902, Freiburg.

165. The ear is first syringed out and dried carefully with pledgets of cotton wool on a probe. Five minimis of a saturated solution of iodoform in anilin oil are then soaked up on a small piece of cotton wool and applied to the affected area with forceps and left in position for about five minutes; the excess of the solution after removal of the plug is then removed from the walls of the meatus, but not from the tympanum. The application is

repeated twice, or at most three times, in a week. The solution after a time turns crimson in color, when it becomes useless for surgical purposes.

ARTHUR CHEATLE.

166. REIK believes that with proper care and thorough treatment the cure of chronic suppurative otitis is not so hopeless as many seem to regard it. About 50 % of the cases call for some surgical treatment, either of major or minor degree, including among the latter removal of polypus and cauterization of granulation tissue. Where the ordinary means employed in treatment do not bring about a favorable result, it will be found in most instances that necrosis of the ossicles exists, and removal of the diseased bones will permit a cure, through improved drainage and better cleansing of the tympanum. It is stated that about 50 % of the one-half requiring operation will be cured in this way. The radical operation will have to be performed in the remainder, and as surgeons become more familiar with the technique of this operation, the small percentage of cases now considered incurable will be still further reduced. CLEMENS.

167. In this paper BALLANCE describes his method up to date. The scheme he now adopts is:

1. The removal of the disease and the fashioning of the meatal flap.
2. One week later the epithelial grafting operation.
3. A few days (from the sixth to the ninth) after this—and the earlier the better after the graft has taken,—the removal of the dead portion of the graft as a deliberate measure.
4. Dry gauze tamponing through the meatus until the gauze comes away unstained.

ARTHUR CHEATLE.

168. KOHLMAYER distinguishes between naked polypi—that have epithelium on the surface; transitional polypi—with partial epithelium covering; and those which are completely covered with either squamous or cylindrical epithelium. The naked polypi contained foreign bodies, epithelial scales, or hair. These foreign bodies can therefore be regarded as the cause of the polypi-formation. In the treatment of middle-ear suppuration it is therefore very important, from a prophylactic standpoint, to cleanse the middle ear as thoroughly as possible. The histological details must be read in the original. HOELSCHER.

169. NOLTE describes the operation as practised in the Freiburg Clinic, which combines the advantages of the Zaufal and

Stacke methods. The posterior canal wall is first removed in its lateral part; then, following Stacke's method, the lateral wall of the attic is removed and the intervening bone between the canal and the antrum resected. After exposure of the operative field the auricle is split in "T" shape, and the cutaneous wound is sutured.

BRUEHL.

c.—CEREBRAL COMPLICATIONS.

170. **Krause.** On exposure of the posterior surface of the petrous bone and of the cerebellum. Bruns, *Beiträge zur klin. Chir.*, vol. xxxvii., No. 3.
171. **Streit.** A method to expose deep-seated epidural abscesses, proceeding from the apex of the petrous pyramid. *Arch. f. Ohrenheilk.*, vol. lviii., p. 169.
172. **Goris.** A case of cerebral surgery for complication of chronic purulent otitis. Recovery. *Ann. des mal. de l'or., du lar.*, 1903, I.
173. **Rimini.** Two cases of cerebral abscess, following chronic purulent otitis. *Arch. ital. di otol.*, vol. xiii., No. 3.
174. **Wilson.** Case of temporo-sphenoidal abscess and lepto-meningitis, showing remarkable latency of symptoms. *Brit. Med. Journ.*, May 2, 1903.
175. **Lermoyez.** Otogenous cerebellar abscess. Operation; recovery. *Ann. des mal. de l'or., du lar.*, 1903, I.
176. **Frey.** Contribution to the study of otitic cerebral abscess. *Arch. internat. d'otol.*, etc., 1903, S. 306.
177. **Laurens.** Cerebral and cerebellar abscesses, with phlebitis of the lateral sinus, of aural origin. Operation; recovery. *Ann. des mal. de l'or., du lar.*, 1903, 2.
178. **Grant.** Case of cerebellar abscess following middle-ear disease. *Brit. Med. Journ.*, May 2, 1903.
179. **Angus.** A case of cerebellar abscess and thrombosis of the lateral sinus. Operation; recovery. *Brit. Med. Journ.*, April 4, 1903.
180. **Willis.** Thrombosis of the lateral sinus; general septic infection. Venous transfusion; recovery. *Lancet*, June 13, 1903.
181. **Guttman.** A case of epidural abscess of otitic origin. Operation; recovery. *N. Y. Med. Journ.*, May 9, 1903.
182. **Molinie.** Thrombophlebitis of the lateral sinus. *Arch. internat. d'otol.*, etc., 1903, p. 348.
183. **Duroux.** Mastoiditis, thrombophlebitis of the lateral sinus and of the internal jugular. *Lyon méd.*, 1903, p. 981.
184. **Zaufal.** On exposure and irrigation of the bulb of the jugular vein in the operation for septic sinus thrombosis. *Arch. f. Ohrenheilk.*, vol. lviii., p. 131.
185. **Grossmann.** An unusual condition in cholesteatoma and sinus thrombosis. *Deutsche med. Wochenschr.*, 1903, No. 24.

KRAUSE reports: (1) A case which he had operated on with Jansen in May, 1902, of a deep-seated subdural collection of pus on the posterior surface of the right petrous bone. On ac-

count of an empyema of the mastoid process after acute otitis the antrum was exposed, and later the typical radical operation was performed. The course at first was normal; then fever— $39.6^{\circ}\text{C}.$,—severe right-sided frontal headache and rigidity of neck set in. There was no pain on pressure, or percussion; the eye grounds were normal; right paresis of the abducent nerve, later photophobia; pulse nothing characteristic; bowels regular. Operation: After making a von Bergmann flap, the dura was removed from the upper surface of the petrous bone, the brain and the dura were elevated by a Krause spatula—some bleeding from a rupture into the superior petrosal sinus. Pus appeared from the depth; the dura was separated from the posterior petrous surface, and a very large, deep-seated subdural abscess was evacuated. The diseased focus was found at the posterior and upper margin of the petrous pyramid. It was removed. The cavity at operation was 7.8cm deep.

After the operation, turning of the body and of the head towards the affected side, and facial paralysis. Good recovery. Krause reports that the von Bergmann incision suffices for extensive exposure of the posterior surface of the petrous bone. The one-sided frontal headache, without pain on pressure or percussion, is of diagnostic value. [One-sided frontal headache without pain on pressure also occurs in other intracranial diseases—for instance, in cerebellar abscess.—Reviewer.]

To simplify the exposure of these deep lesions the combined respiratory curette as advised by otologists, might be of value.

(2) Intradural section of the right acoustic nerve on account of persistent tinnitus with deafness on the same side. The intradural way was selected because of danger of severe injury to the sigmoid and to the superior petrosal sinuses and to the facial nerve in the subdural method. Operation: A large flap composed of skin and bone is made, the size of one-half of the cerebellum. A large dural flap is then made by an incision along the lateral, the transverse, and the occipital sinuses. The flap is turned down, the right cerebellar lobe is elevated to the left side—some hemorrhage, which was arrested by packing. The posterior surface of the petrous bone was easily visible. The acoustic nerve was then divided. The flap was sutured.

After the operation, slight facial paralysis. The tinnitus continued for a time, but decreased after the third day. On the fourth day pneumonia set in, to which the patient, who was sixty-

three years of age, succumbed. At autopsy the wounds were healed primarily, and there was no meningitis.

(3 and 4) Two cases of exposure of both cerebellar lobes on account of a supposed cerebellar tumor.

In the first case—in two sittings each cerebellar half was exposed by reflecting a large flap composed of skin and bone and a large dural flap. The cerebellar lobe was then divided as in an anatomical section. No tumor was found. The operations were well borne by the patient, who was a boy eleven years of age. Owing to the reduction of intracranial pressure, some relief in the symptoms followed. Death after three years. No tumor was found at autopsy, but an internal hydrocephalus. Unusual softening of the distended brain.

In the second case, both cerebellar halves were simultaneously exposed by the formation of a large flap. After a double ligation the occipital sinus was divided. A large dural flap was formed by an incision below the transverse sinus, and turned down. The tentorium cerebelli was elevated with the brain spatula, thereby permitting a survey and palpation of the upper surface of the cerebellum. No tumor. Anatomical section through the right cerebellar half. The left lateral ventricle was punctured and 200ccm of liquid evacuated. Transient collapses. Suture of the dural flap. The dura and cutaneous wounds were closed. No special post-operative disturbances. Sudden death on the sixth day. At autopsy the wound was found in good condition. An unusually marked deformity of the base of the skull. Chronic ependymitis. Internal hydrocephalus.

Krause emphasized the broad exposure and extensive division of the cerebellum, as otherwise no survey is possible, and the tumor cannot be found. If time is to be spared, the bone should be sacrificed. The ligation of the sinus, which may be of importance to the otologist, is made by passing a suture around it after an incision in the dura vertical to the sinus has been made in order to determine its extent. To expose an otitic cerebellar abscess, the old method of a search from the posterior petrous surface is probably the better.

HOELSCHER.

171. STREIT describes an operation to expose deep-seated collections of pus especially situated underneath the Gasserian ganglion. He considers this to be without danger, as a result of his trials on cadavers, and recommends it for exploratory operations. He has thus far not been able to perform the operation on the living.

The cutaneous incision passes around the auricle, beginning in front $1\frac{1}{2}$ cm above the tragus; a second incision passes up and back in the direction from the supra-meatal spine to the point of junction of the lambdoid and sagittal sutures, and is 3 cm long. After retracting the auditory canal from the bony canal and exposing the middle-ear cavities, the upper bony wall and the base of the zygomatic process is resected, and the dura is exposed to an extent 3 cm above this. After the removal of the roof of the tympanum and the antrum the dura is laid free in the form of an oval $2\frac{1}{2} \times 2$ cm. With a dural spatula the dura is elevated from the bone internally from the tegmen tympani. The horizontal semicircular canal should always be visible between the branches of the spatula.

The patient is then changed to a half-sitting posture and inclined to the operative side. An adhesion at the hiatus spurius and at the superior margin of the petrous pyramid forms a pocket in the dura which leads the spatula to the Gasserian ganglion, which can be removed with the aid of Streit's raspatory curette. This instrument also serves the purpose of separating adhesions, as well as to remove granulations and carious bone. The distance from the route of the zygomatic process to the Gasserian ganglion is from 4.5-2.7 cm, averaging 3.5; the distance to the apex of the pyramid is but 5.5, averaging 4.2-4.5 cm.

Streit believes that in his operation a dangerous pressure on the brain can be more easily avoided than in the Krause operation. Hemorrhages may take place from the posterior branch of the middle meningeal, as well as from the petro-squamous sinus. Hemorrhage from a carotid artery can be avoided with some care.

If the Streit operation has disclosed such an extensively diseased focus that this method does not suffice, then a more extensive procedure can be attempted.

HAENEL.

172. GORIS's case is unusual, inasmuch as nothing pointed to the ear. There was headache behind the eyes and diplopia of a month's standing. In addition to the paralysis of the oblique there was a double-sided optic neuritis. As no sufficient cause could be found from the nose, the ear was examined, and an old chronic suppuration was discovered. The focus in the ear was first eradicated, and then a large trephined opening was made in the squama and the lower surface of the temporal lobe exposed. In the above, probably at the apex of the pyramid, a movable

sequestrum was found, on the removal of which the symptoms rapidly disappeared and complete recovery followed, which remained unchanged four months later. **ZIMMERMANN.**

173. After describing the clinical course and the autopsy report of two cases of otitic brain abscess, lumbar puncture is spoken of as a very important means for differential diagnosis between meningitis and brain abscess.

AUTHOR'S ABSTRACT.

175. After a complete description of this successful case, the author remarks upon how difficult it often is to diagnosticate the abscess unless the left side is affected—as in the present case—and aphasic symptoms are produced. One would be inclined to make a diagnosis, if after the evacuation of an extradural abscess weakness and emaciation of the patient continued. As regards operation, the author recommends removing the original site of the disease, then exposing the brain abscess, *not* from the ear, but through the trephined opening in the squama.

ZIMMERMANN.

174. The patient was a man aged twenty-two years, who was admitted under Mr. Alexis Thomson in the Edinburgh Royal Infirmary in August, 1900. At the age of seventeen he had a blow behind the right ear; a month later he had occasional pain on the right side of the head for six months, when it suddenly increased in severity, and the ear began to discharge. In the autumn of '97 he had influenza, which caused the pain and discharge to increase; the former gradually subsided, but as the ear continued to discharge, he was admitted on August 22, 1900. There were no mastoid symptoms or signs at 3 P.M. At 6:30 he went to bed after helping to bring in the ward tea, feeling in his usual health. At 7:15 he complained of a slight ache in the occipital region; at 7:30 the pain had greatly increased and he lay on his right side, holding the back of his head with both hands. The head was retracted. The knee jerks were abolished. No tremors, paralysis, strabismus, or photophobia. The pupils were rather contracted, equal, and reacted very sluggishly to light. Pulse 90 Temp. 99° F. At 7:45 vomiting commenced, and he was very restless. At 9:15 Thomson operated. The antrum contained very offensive pus; while following the antrum into the middle ear there was a sudden rush of about 1½ ounces of stinking pus, which apparently escaped from an abscess in the temporo-sphenoidal lobe through an opening in the tympanic cavity.

A tube was inserted. He died at 8 A.M. on the next day. At the post-mortem examination extensive purulent meningitis was found at the base over the pons, medulla, and cerebellum, and extending up the Sylvian fissure on both sides of the cerebrum. The right temporo-sphenoidal lobe was occupied by an abscess lying to the outer side of the descending horn of the lateral ventricle. An opening was found in the abscess wall and dura corresponding with the opening in the roof of the tympanic cavity.

ARTHUR CHEATLE.

176. Four cases of abscess of the temporal lobe following chronic purulent otitis.

1. A man of twenty-five years of age, left-sided abscess, producing periods of excitement and aphasia; high fever— 39.4° C., retarded pulse, motor weakness in the right hand. After evacuation of abscess the temperature still varied and the psychic disturbance increased. Recovery after nine weeks; the patient, however, who was formerly a good accountant, could no longer multiply.

2. A man twenty-eight years of age, suffered from periodic insanity following left-sided chronic purulent otitis; a subdural periosteal abscess developed on the squama. As after the evacuation of this abscess and opening of the mastoid process the temperature did not fall, and right-sided facial paralysis and aphasia set in, a second operation was performed, and the abscess was found in the temporal lobe. One day later death from cerebral oedema. Lumbar puncture performed one day before death showed clouded fluid containing bacteria. At autopsy the meninges were found unchanged, but a circumscribed meningitis was present in the lower part of the spinal cord.

3. A man twenty-five years of age, with a bilateral chronic purulent otitis on the right side, with cholesteatoma and abscess in the temporal lobe as large as a small apple. Psychic disturbance right-sided, pain in the ear and in the head, paresis of the right elevator of the eyelid, right mydriasis, hemiopia, Romberg's phenomenon, increased patellar reflexes, ankle clonus; operation; recovery.

4. Abscess in the left temporal lobe without focal symptoms. The operation exposed the abscess. Eight days later it was spontaneously evacuated. Death.

FREY concludes as follows: At a time when the abscess does not produce any focal symptoms the brain tissue in the surrounding

parts of the abscess is œdematosus to a marked degree. As œdema of the brain rapidly leads to death, the diagnostic incisions into the brain tissue should be made as early as possible, and the focal symptoms should not be waited for. Fever can be present in uncomplicated brain abscess. Lumbar puncture cannot be used to decide whether operation is still indicated. Disturbance of the sensorium is a frequent symptom of brain abscess. The abscess should be exposed from the middle ear, and not from the squama. Examination of the abscess cavity with the finger, if carefully performed, does no harm, and simplifies the evacuation of the abscess.

OPPIKOFER.

177. A woman, twenty-nine years of age, two months ago had suffered from a right-sided purulent otitis after influenza. After cessation of the discharge, headache, emaciation, rigors, set in with fever, and finally with slight stupor. Lumbar puncture gave a clear fluid under normal pressure. An examination for cells and bacteria was not made. After ligating the apparently healthy jugular vein, the mastoid process was opened, the sinus and a perisinuous abscess opened, and a cerebellar abscess was evacuated through the sinus wall at a depth of 2cm. During the first ten days, the progress was favorable, then severe headache was complained of, located in the region of the antrum; the pulse was retarded, and fever set in. The roof of the antrum was then removed; the dura was found discolored—green,—and an abscess in the temporal lobe was evacuated, containing a coffee-spoon of pus. Gradual recovery—which condition remained unchanged five months later.

ZIMMERMANN.

178. A man aged twenty-six years had suffered from slight discharge from the left ear. The radical mastoid operation was performed on account of occipital pain, high temperature, etc., the cells were full of pus and the bone of the sigmoid groove was eroded, exposing the lateral sinus, which contained fluid blood. The patient was relieved, but on the thirty-ninth day after the operation the headache returned and vomiting set in with prostration and marked fall of pulse rate. A further operation was decided on. Under the anaesthetic, respiration ceased; the cerebellum was quickly exposed, and explored with a hollow needle; as nothing was found, the temporo-sphenoidal lobe was explored, also with a negative result. There was no bulging on exposure and the brain pulsated. Thirty-two hours later he died. At the post-mortem examination an abscess, containing

about a drachm or a drachm and a half of pus, was found in the cerebellum in contact with the lateral sinus just beyond the sigmoid groove. There was little doubt that the needle passed through the abscess wall, but must have become blocked.

ARTHUR CHEATLE.

179. A boy after having had a cerebellar abscess opened, developed lateral sinus thrombosis, necessitating removal of the internal jugular vein from clavicle to mastoid.

ARTHUR CHEATLE.

180. WILLIS was unable to get below the clot in the internal jugular vein, and the rigor and high temperature persisted. Recovery took place after two transfusions of three pints of saline solution and one ounce of brandy into the median basilic vein.

ARTHUR CHEATLE.

181. The patient, female aged fifteen, developed acute otitis media following a cold. There was severe pain, a temperature of 103° F., accompanied by vomiting and a chill. No swelling over the mastoid, but it was sensitive on pressure over the region of the emissary veins. Shrapnell's membrane was much swollen and bulging; it was incised and thick creamy pus evacuated. Relief followed for a few days only, when the headache, vomiting, stiffness of the neck, and stupor reappeared. Mastoidectomy was performed, and on entering the antrum much pus was found. A fistula was discovered in this region which, being enlarged, a stream of pus mixed with blood rushed out under high pressure. After evacuating the pus the dura was found covered with a thick, villous, fatty, grayish-colored granulation tissue. The lateral sinus could not be found. In five months the case had entirely recovered.

CLEMENS.

182. A patient had suffered since childhood from otorrhœa, and came to operation after facial paralysis and chills had set in. After the first few blows of the chisel, the breathing suddenly stopped. Artificial respiration was continued for two hours, and though the pulse remained fairly good death ensued. At autopsy, the pre-supposed abscess was situated at the lower surface of the cerebellum. The author believes that infection travelled along the aqueductus vestibuli to the posterior cranial fossa, and that the sudden paralysis of the respiration centre was caused by increased intracranial pressure.

NOLTENIUS.

183. From a study of thirty-two cases of uncomplicated

meningitis, as shown by autopsy, the author investigated the various symptoms as regards their frequency and their diagnostic importance, and concluded as follows:

The various symptoms do not offer anything characteristic for purulent meningitis. A pathognomonic symptom does not exist. The simultaneous presence of a number of symptoms makes a diagnosis possible in pronounced cases. Schwartz states, with right, that the onset of a severe disturbance of the sensorium, with clonic and tonic convulsions of the extremities, or hemiplegia, make the diagnosis unquestionable. Inasmuch as purulent meningitis of itself may be difficult to diagnosticate, the diagnosis becomes still more difficult if the meningitis is of otitic origin, as the ear disease may present all the symptoms of a meningitis—as in retention of pus in the tympanum, or disease of the labyrinth. The differentiation of the various intracranial complications of the middle ear is often impossible from clinical observation alone. An early diagnosis of otitic meningitis has been made possible by the introduction of lumbar puncture. Proof for the presence of diffuse purulent meningitis, according to the recent experiments of the clinic in Halle, is furnished—not by the presence of increased leucocytes in a cloudy cerebro-spinal fluid, but by the presence of bacteria in this fluid. To determine the presence of bacteria, in the first place, a smear is necessary. This change in the opinion of the clinic was the result of four cases, in which lumbar puncture showed a cloudiness of the spinal fluid, increased leucocytes but no bacteria, where the conditions found present at operation, and the subsequent course, excluded diffuse purulent meningitis. In pronounced meningitis, it has never been possible in the clinic at Halle to save the patient's life. Notwithstanding, the author reports two cases of unquestionable meningitis—as was proved by the bacteriological examination—where without any operation, the meningitis was recovered from. It is uncertain whether the lumbar puncture in these cases exercised any favorable therapeutic influence. The standpoint of the clinic in Halle, from a therapeutic view-point, is as follows: A cloudiness of the puncture-fluid not produced by leucocytes does not in itself contra-indicate an operation. Even the microscopic determination of the increased leucocytes in the spinal fluid cannot give an indication against operation where the operation is indicated from the condition of the ear or from the general state of the

patient. If bacteria, however, are found present, as in the case of pronounced diffuse purulent meningitis, the author considers operations in these cases to be to-day in general contra-indicated. The thirty-two case-histories follow. **HAENEL.**

184. The mastoid process was opened in a left-sided acute otitis media, and a normal sinus was injured. The wound was packed; three days later the jugular vein was resected and the sinus was opened, on account of thrombo-phlebitis. Recovery.

OPPIKOFER.

185. A patient, twenty-six years of age, suffered from a right-sided chronic purulent otitis with thrombosis of the lateral sinus and of the internal jugular vein. Temperature (40° C.), headache, vertigo, and chills; no metastases. The thrombi were removed from the sinus, and the vein later was ligated. Recovery.

OPPIKOFER.

186. **ZAUFAL** recognizes in Grunert's operation for the methodic exposure of the bulb of the jugular vein a distinct advance. In the cases where on account of unfavorable anatomical relations Grunert's operation cannot be performed, **PIFFL** has suggested exposing the bulb from the floor of the tympanum. This latter procedure is somewhat easier of execution, though Grunert's operation has the advantage of a complete uninterrupted exposure of the sinus, the bulb, and the jugular vein. The irrigation of the vein and of the bulb from the peripheric part of the jugular vein, mentioned by Grunert, was suggested by Zaufal in 1884. The latter author considers it to be indicated only in cases where the venous channel is not entirely filled with thrombi. **HAENEL.**

187. The patient, twenty-six years of age, was admitted to the clinic on account of right-sided otorrhœa since childhood. The otorrhœa had not been excessive, nor fetid, and had completely ceased after the removal of a small polypus which was situated up and back at the margin of the vestibule, passing into the aditus. Before admission, the patient had suffered considerably from severe sweats, so that his general condition suffered. There had been no rigors. On the following day two very severe chills occurred. The temperature rose to 41.3° C., and it was decided to operate. In the sclerosed bone two cholesteatomas as large as peas were found surrounded by a matrix. In the region of the tegmen antri, the bone was broken through, and the matrix firmly adhered to the dura. The hori-

zontal semicircular canal showed a defect $1\frac{1}{2}$ mm long, the incus was carious, the hammer healthy, presenting two small granulations at the head. A prolongation of the cholesteatoma extended between the dura and the bone in the direction of the apex of the pyramid. Puncture of the sinus, which appeared externally normal, gave dark, unchanged blood; in the wall of the upper knee, a very small cholesteatomatous pearl, and not far away, two additional and larger ones were found. On the following days the general condition was much improved, but the temperature remained up. At the second operation, the entire extent of the sinus which had previously been exposed, appeared yellowish-gray, and did not pulsate. The opening of the sinus presented a blackish-gray, non-fetid thrombus. Recovery was uneventful. The author considers this, therefore, a case of multiple primary cholesteatoma of the dura, of which the largest had perforated through the tegmen of the antrum. At the first operation, a parietal sinus thrombosis was presented, situated at the place where the small cholesteatoma pearl was found. The author draws attention to the fact that in this case recovery took place without ligature of the jugular vein.

NOLTENIUS.*d.—OTHER MIDDLE-EAR DISEASES.*

188. **Gillman.** Intratympanic injections of pilocarpine in chronic catarrhal deafness. *Four. Michigan State Med. Society*, April, 1903.
189. **Trow.** Mastoiditis due to gonococcus. *Canadian Practitioner and Review*, March, 1903.
190. **Collet and Beutter.** Syphilitic periostitis of the mastoid process. *Lyon Medical*, No. 19, p. 785.

188. **GILLMAN** has been using this form of treatment for several years, and while he has not observed any remarkably favorable results accruing from its use, he has, nevertheless, secured some gratifying success. He has observed that when pilocarpine is used with other treatment there are cases where it proves absolutely effective; while in other cases it appears to simply avert the worst consequences, and still in a third class of cases the disease fails to respond to the drug's influence. **CLEMENS.**

189. Patient, male, aged twenty-two, although anæmic and not at all vigorous, never had gonorrhœa or other venereal disease. A few months before he was seen by the writer a small lump appeared in the submaxillary region associated with sore throat, which continued for a week or two, and was then fol-

lowed by a sharp pain in the right ear. Subsequently a slight swelling behind the right ear was noticed, and at the same time a creamy discharge from the ear and nose occurred. The swelling over the mastoid extended some distance below the tip; the skin was normal in color, showing some pitting on pressure. There was no bulging of the posterior wall. The swelling of the soft tissues disappeared by using the ice-bag, but returned shortly after it was removed. Pain was never a marked symptom. The mastoid was opened and found to be entirely carious, the lateral sinus bathed in pus, and a fistulous opening through the medial plate leading into the neck. Some half dozen examinations of the pus were made with uniform results. Incubation at 37.5° C. for thirty-six hours showed a growth which on staining proved to be a non-capsulated diplococcus. [This was probably the pneumococcus lanceolatus. The gonococcus Neisser loves only the mucous membranes of the uro-genital and ocular mucosæ.—ED.]

CLEMENS.

190. A woman, fifty-three years of age, without any history of syphilis, was treated in the dispensary in December, 1902, on account of painful periosteal swelling over the right leg, which disappeared after two weeks of mercurial inunctions and iodide of potash. After a month, three periosteal swellings appeared at the same time—one over the previous site, on the right tibia; the second, on the inner surface of the left thigh; and the third, over the posterior part of the left mastoid process—which was unusually tender. Headache, especially at night; no fever; auditory canal and tympanum normal. Iodide of potash (60 grains per day) and mercurial inunctions were prescribed. Recovery after three weeks.

OPPIKOFER.

THE NERVOUS APPARATUS.

191. **Babinski.** Lumbar puncture in the treatment of aural affections. *Deutsche med. Wochenschr.*, No. 23, 1903.

192. **James, Alexander.** A case of so-called acute labyrinthitis (Volto-lini). *Lancet*, June 6, 1903.

191. Eight cases of disease of the labyrinth with Ménière's vertigo were treated with benefit by BABINSKI with lumbar puncture. The subjective symptoms like tinnitus were improved. In some of the patients mental disturbances, associated with the aural lesion, disappeared after puncture. According to the author, in all the chronic aural conditions, if the labyrinth is not destroyed, lumbar puncture should be tried. HARTMANN.

192. The case was shown by JAMES at a meeting of the Edinburgh Medico-Chirurgical Society. A girl, aged thirteen years, was seized with illness in December, 1902, complaining of severe occipital pain with fever and great pain on moving the head, and stiffness of the back muscles. Vomiting was almost constant, and she became comatose in two or three days. She recovered in about ten days with hearing greatly impaired, the function soon being completely lost. He also showed a boy, aged seven, who was suddenly seized with vomiting and headache, and in whom blindness instead of deafness resulted. The cases were thought to be an abortive form of epidemic cerebro-spinal meningitis.

ARTHUR CHEATLE.

(*To be continued.*)

NOTICES.

THE THIRTEENTH ANNUAL MEETING OF THE GERMAN OTOLOGICAL SOCIETY will be held in Berlin, on May 20 and 21, 1904.

THE TENTH ANNUAL MEETING OF THE AMERICAN LARYNGOLOGICAL, RHINOLOGICAL, AND OTOLOGICAL SOCIETY will be held in Chicago, Ill., on May 30, 31, and June 1, 1904, under the presidency of Dr. NORVAL H. PIERCE.

Dr. GORHAM BACON has been appointed Clinical Professor of Otology in Columbia University, to succeed Prof. A. H. BUCK, resigned.

A SPECIAL CLINIC FOR DISEASES OF THE EAR, NOSE, AND LARYNX has been organized by the Bordeaux faculty, under the direction of Dr. Moure. This is the first clinic for this specialty in the French universities.

Fig. 1.

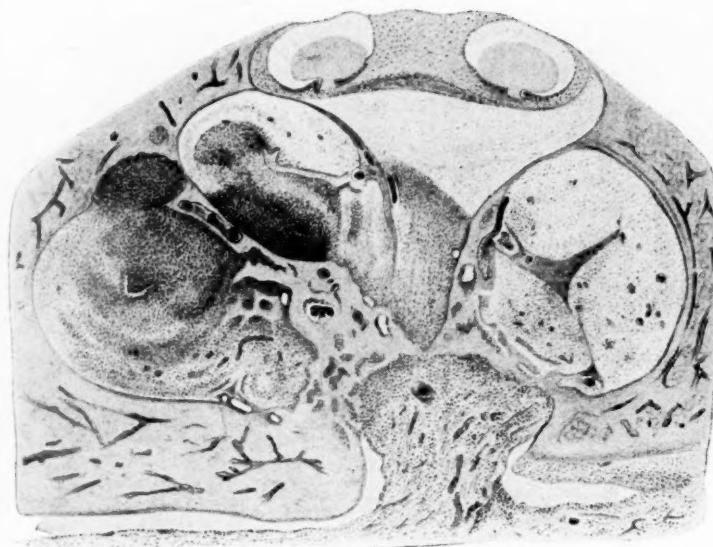
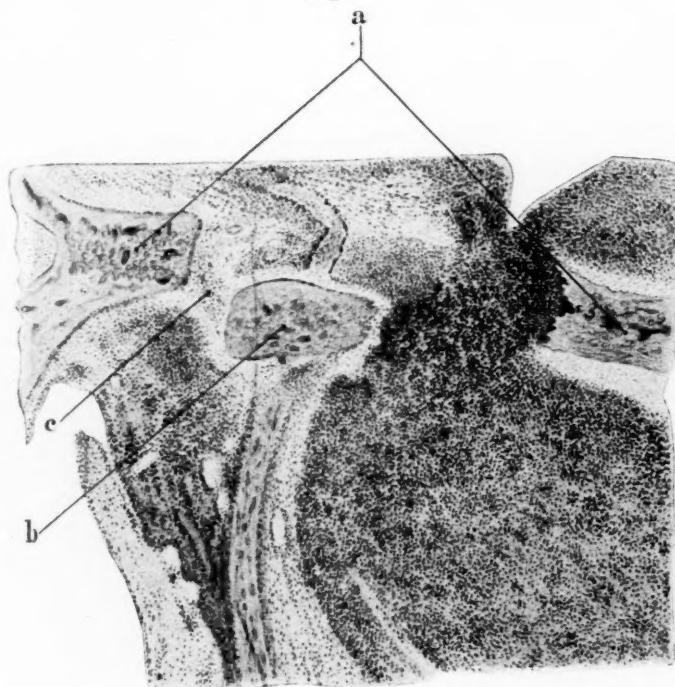


Fig. 2.



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Fig. 3.

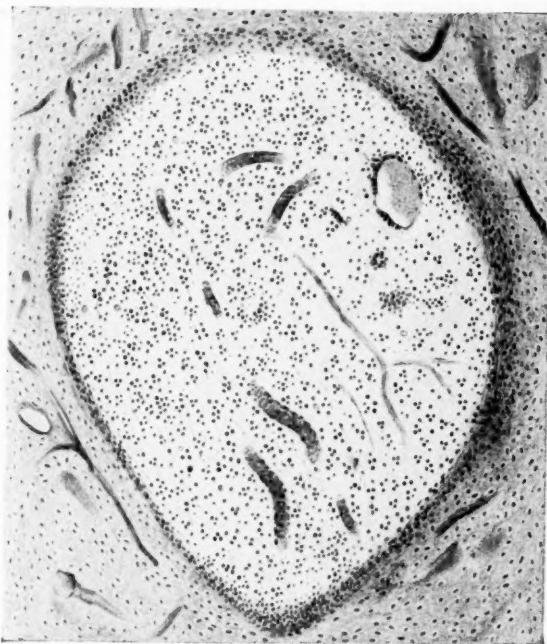
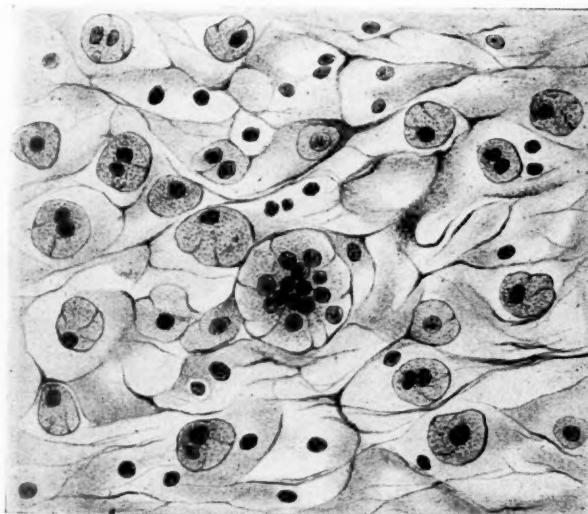


Fig. 4.



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